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# AN HISTORY OF THE EARTH, AND ANIMATED NATURE:

By OLIVER GOLDSMITH.

VOL. VI.

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AN

# AN HISTORY OF BIRDS.

## *CONTINUATION OF PART V.*

### OF

## BIRDS OF THE CRANE KIND.

### CHAP. VI.

### Of the Bittern or Mire drum.

THOSE who have walked in an evening by the ſedgy ſides of unfrequented rivers, muſt remember a variety of notes from different waterfowl: the loud ſcream of the wild gooſe, the croaking of the mallard, the whining of the lapwing, and the tremulous neighing of the jack ſnipe. But of all thoſe ſounds, there is none ſo diſmally hollow as the booming of the

bittern. It is impoſſible for words to give thoſe who have not heard this evening-call an adequate idea of its ſolemnity. It is like the interrupted bellowing of a bull, but hollower and louder, and is heard at a mile's diſtance, as if iſſuing from ſome formidable being that reſided at the bottom of the waters.

The bird, however, that produces this terrifying ſound is not ſo big as an heron, with a weaker bill, and not above four inches long. It differs from the heron chiefly in its colour, which is in general of a paleiſh yellow, ſpotted and barred with black. Its wind-pipe is fitted to produce the ſound for which it is remarkable; the lower part of it dividing into the lungs is ſupplied with a thin looſe membrane, that can be filled with a large body of air and exploded at pleaſure. Theſe bellowing exploſions are chiefly heard from the beginning of ſpring to the end of autumn; and, however awful they may ſeem to us, are the calls to courtſhip, or of connubial felicity.

From the loudneſs and ſolemnity of the note, many have been led to ſuppoſe, that the bird made uſe of external inſtruments to produce it, and that ſo ſmall a body could never eject ſuch a quantity of tone. The common people are of opinion, that it thruſts its bill into a reed

that ſerves as a pipe for ſwelling the note above its natural pitch; while others, and in this number we find Thomſon the poet, imagine that the bittern puts its head under water, and then violently blowing produces its boomings. The fact is, that the bird is ſufficiently provided by nature for this call; and it is often heard where there are neither reeds nor waters to aſſiſt its ſonorous invitations.

It hides in the ſedges by day, and begins its call in the evening, booming ſix or eight times, and then diſcontinuing for ten or twenty minutes to renew the ſame ſound. This is a call it never gives but when undiſturbed and at liberty. When its retreats among the ſedges are invaded, when it dreads or expects the approach of an enemy, it is then perfectly ſilent. This call it has never been heard to utter when taken or brought up in domeſtic captivity; it continues under the control of man a mute forlorn bird, equally incapable of attachment or inſtruction. But, though its boomings are always performed in ſolitude, it has a ſcream which is generally heard upon the ſeizing its prey, and which is ſometimes extorted by fear.

This bird, though of the heron-kind, is yet neither ſo deſtructive nor ſo voracious. It is a retired timorous animal, concealing itſelf

in the midſt of reeds and marſhy places, and living upon frogs, inſects, and vegetables; and though ſo nearly reſembling the heron in figure, yet differing much in manners and appetites. As the heron builds on the tops of the higheſt trees, the bittern lays its neſt in a ſedgy margin, or amidſt a tuft of ruſhes. The heron builds with ſticks and wool; the bittern compoſes its ſimpler habitation of ſedges, the leaves of water-plants and dry ruſhes. The heron lays four eggs; the bittern generally ſeven or eight, of an aſh-green colour. The heron feeds its young for many days; the bittern in three days leads its little ones to their food. In ſhort, the heron is lean and cadaverous, ſubſiſting chiefly upon animal food; the bittern is plump and fleſhy, as it feeds upon vegetables when more nouriſhing food is wanting.

It cannot be, therefore, from its voracious appetites, but its hollow boomb, that the bittern is held in ſuch deteſtation by the vulgar. I remember in the place where I was a boy with what terror this bird's note affected the whole village; they conſidered it as the preſage of ſome ſad event; and generally found or made one to ſucceed it. I do not ſpeak ludicrouſly; but if any perſon in the neighbourhood died, they ſuppoſed it could not be otherwiſe, for the

night-raven had foretold it; but if nobody happened to die, the death of a cow or a ſheep gave completion to the prophecy.

Whatever terror it may inſpire among the ſimple, its fleſh is greatly in eſteem among the luxurious. For this reaſon, it is as eagerly ſought after by the fowler as it is ſhunned by the peaſant; and as it is a heavy riſing, ſlow winged bird, it does not often eſcape him. Indeed, it ſeldom riſes but when almoſt trod upon; and ſeems to ſeek protection rather from concealment than flight. At the latter end of autumn, however, in the evening, its wonted indolence appears to forſake it. It is then ſeen riſing in a ſpiral aſcent till it is quite loſt from the view, making at the ſame time a ſingular noiſe very different from its former boomings. Thus the ſame animal is often ſeen to aſſume different deſires; and while the Latins have given the bittern the name of the ſtar reaching bird (or the *ſtellaris*) the Greeks, taking its character from its more conſtant habits, have given it the title of the ὀκνηρὸς, or the lazy.

## CHAP. VII.

### Of the Spoonbill or Shoveler.

AS we proceed in our deſcription of the crane kind, birds of peculiar forms offer, not entirely like the crane, and yet not ſo far different as to rank more properly with any other claſs. Where the long neck and ſtilt-like legs of the crane are found, they make too ſtriking a reſemblance, not to admit ſuch birds of the the number; and though the bill or even the toes ſhould entirely differ, yet the outlines of the figure, and the natural habits and diſpoſitions being the ſame, theſe are ſufficient to mark their place in the general groupe of nature.

The Spoonbill is one of thoſe birds which differs a good deal from the crane, yet approaches this claſs more than any other. The body is more bulky for its height, and the bill is very differently formed from that of any other bird whatever. Yet ſtill it is a comparatively tall bird; it feeds among waters; its toes are divided; and it ſeems to poſſeſs the natural diſpoſitions of the crane. The European ſpoonbill is of about the bulk of a crane; but

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1 A Species of the Calao 253
2 The Spoon bill.

as the one is above four feet high, the other is not more than three feet three inches. The common colour of thoſe of Europe, is a dirty white; but thoſe of America are of a beautiful roſe colour, or a delightful crimſom. Beauty of plumage ſeems to be the prerogative of all the birds of that continent; and we here ſee the moſt ſplendid tints beſtowed on a bird, whoſe figure is ſufficient to deſtroy the effects of its colouring; for its bill is ſo odly faſhioned, and its eyes ſo ſtupidly ſtaring, that its fine feathers only tend to add ſplendour to deformity. The bill, which in this bird is ſo very particular, is about ſeven inches long, and running out broad at the end, as its name juſtly ſerves to denote; it is there about an inch and a half wide. This ſtrangely faſhioned inſtrument, in ſome is black; in others of a light grey; and in thoſe of America, it is of a red colour, like the reſt of the body. All round the upper chap there runs a kind of rim, with which it covers that beneath; and as for the reſt, its cheeks, and its throat, are without feathers, and covered with a black ſkin.

A bird ſo oddly faſhioned, might be expected to poſſeſs ſome very peculiar appetites; but the ſpoonbill ſeems to lead a life entirely reſembling all thoſe of the crane kind; and Nature, when

ſhe made the bill of this bird ſo very broad, ſeems rather to have ſported with its form, than to aim at any final cauſe for which to adapt it. In fact, it is but a poor philoſophy to aſcribe every capricious variety in nature to ſome ſalutary purpoſe: in ſuch ſolutions we only impoſe upon each other; and often wilfully contradict our own belief. There muſt be imperfections in every being, as well as capacities of enjoyment. Between both, the animal leads a life of moderate felicity; in part making uſe of its many natural advantages, and in part neceſſarily conforming to the imperfections of its figure.

The ſhoveler chiefly feeds upon frogs, toads and ſerpents; of which, particularly at the Cape of Good Hope, they deſtroy great numbers. The inhabitants of that country hold them in as much eſteem as the ancient Egyptians did their bird ibis: the ſhoveler runs tamely about their houſes; and they are content with its ſociety, as a uſeful though an homely companion. They are never killed; and indeed they are good for nothing when they are dead, for the fleſh is unfit to be eaten.

This bird breeds in Europe, in company with the heron, in high trees; and in a neſt formed of the ſame materials. Willoughby tells us, that in a certain grove, at a village

called Seven Huys, near Leyden, they build and breed yearly in great numbers. In this grove alſo, the heron, the bittern, the cormorant, and the ſhag, have taken up their reſidence, and annually bring forth their young together. Here the crane kind ſeem to have formed their general rendezvous; and, as the inhabitants ſay, every ſort of bird has its ſeveral quarter, where none but their own tribe are permitted to reſide. Of this grove the peaſants of the country make good profit. When the young ones are ripe, thoſe that farm the grove, with a hook at the end of a long pole, catch hold of the bough on which the neſt is built, and ſhake out the young ones; but ſometimes the neſt and all tumble down together.

The ſhoveler lays from three to five eggs; white, and powdered with a few ſanguine or pale ſpots. We ſometimes ſee, in the cabinets of the curious, the bills of American ſhovelers, twice as big and as long as thoſe of the common kind among us; but theſe birds have not yet made their way into Europe.

CHAP.

## CHAP. VIII.

### The Flamingo.

THE Flamingo has the juſteſt right to be placed among cranes; and though it happens to be web-footed, like birds of the gooſe kind, yet its height, figure and appetites, entirely remove it from that groveling claſs of animals. With a longer neck and legs than any other of the crane kind, it ſeeks its food by wading among waters; and only differs from all of this tribe in the manner of ſeizing its prey; for as the heron makes uſe of its claws, the flamingo uſes only its bill, which is ſtrong and thick for the purpoſe, the claws being uſeleſs, as they are feeble, and webbed like thoſe of water fowl.

The flamingo is the moſt remarkable of all the crane kind, the talleſt, bulkieſt, and the moſt beautiful. The body, which is of a beautiful ſcarlet, is no bigger than that of a ſwan; but its legs and neck are of ſuch an extraordinary length, that when it ſtands erect, it is ſix feet ſix inches high. Its wings, extended, are five feet ſix inches from tip to tip; and it is four feet eight inches from tip to tail. The

De Seve del. Jf.c Taylor sculp.

1. Flamingo, 2. Avosetta.

head is round and ſmall, with a large bill, ſeven inches long, partly red, partly black, and crooked like a bow. The legs and thighs, which are not much thicker than a man's finger, are about two feet eight inches high; and its neck near three feet long The feet are not furniſhed with ſharp claws, as in others of the crane kind; but feeble, and united by membranes, as in thoſe of the gooſe. Of what uſe theſe membranes are does not appear, as the bird is never ſeen ſwimming, its legs and thighs being ſufficient for bearing it into thoſe depths where it ſeeks for prey.

This extraordinary bird is now chiefly found in America, but was once known on all the coaſts of Europe. Its beauty, its ſize, and the peculiar delicacy of its fleſh, have been ſuch temptations to deſtroy or take it, that it has long ſince deſerted the ſhores frequented by man, and taken refuge in countries that are as yet but thinly peopled. In thoſe deſert regions, the flamingos live in a ſtate of ſociety, and under a better polity than any other of the feathered creation.

When the Europeans firſt came to America, and coaſted down along the African ſhores, they found the flamingos on ſeveral ſhores on either continent, gentle and no way diſtruſtful

of mankind*. They had long been uſed to ſecurity, in the extenſive ſolitudes they had choſen; and knew no enemies, but thoſe they could very well evade or oppoſe. The Negroes and the native Americans, were poſſeſſed but of few deſtructive arts for killing them at a diſtance; and when the bird perceived the arrow, it well knew how to avoid it. But it was otherwiſe when the Europeans firſt came among them: the ſailors, not conſidering that the dread of fire-arms was totally unknown in that part of the world, gave the flamingo the character of a fooliſh bird, that ſuffered itſelf to be approached and ſhot at. When the fowler had killed one, the reſt of the flock, far from attempting to fly, only regarded the fall of their companion in a kind of fixed aſtoniſhment: another and another ſhot was diſcharged; and thus the fowler often levelled the whole flock, before one of them began to think of eſcaping.

But at preſent it is very different in that part of the world; and the flamingo is not only one of the ſcarceſt but of the ſhyeſt birds in the world, and the moſt difficult of approach. They chiefly keep near the moſt deſerted and inhoſpitable ſhores; near ſalt-water lakes and

* Albin's New Hiſtory of Birds.

ſwampy iſlands. They come down to the banks of rivers by day; and often retire to the inland, mountainous parts of the country at the approach of night. When ſeen by mariners in the day, they always appear drawn up in a long cloſe line of two or three hundred together; and, as Dampier tells us, preſent, at the diſtance of half a mile, the exact repreſentation of a long brick wall. Their rank, however, is broken when they ſeek for food; but they always appoint one of the number as a watch, whoſe only employment is to obſerve and give notice of danger, while the reſt are feeding. As ſoon as this truſty centinel perceives the remoteſt appearance of danger, he gives a loud ſcream, with a voice as ſhrill as a trumpet, and inſtantly the whole cohort are upon the wing. They feed in ſilence; but, upon this occaſion, all the flock are in one chorus, and fill the air with intolerable ſcreamings.

From this it appears that the flamingos are very difficult to be approached at preſent, and that they avoid mankind with the moſt cautious timidity; however, it is not from any antipathy to man that they ſhun his ſociety, for in ſome villages, as we are aſſured by Labat, along the coaſt of Africa, the flamingos come

in great numbers to make their reſidence among the natives. There they aſſemble by thouſands, perched on the trees, within and about the village; and are ſo very clamorous, that the ſound is heard at near a mile diſtance. The Negroes are fond of their company; and conſider their ſociety as a gift of Heaven, as a protection from accidental evils. The French, who are admitted to this part of the coaſt, cannot, without ſome degree of diſcontent, ſee ſuch a quantity of game untouched, and rendered uſeleſs by the ſuperſtition of the natives: they now and then privately ſhoot ſome of them, when at a convenient diſtance from the village, and hide them in the long graſs, if they perceive any of the Negroes approaching; for they would probably ſtand a chance of being ill treated, if the blacks diſcovered their ſacred birds were thus unmercifully treated.

Sometimes, in their wild ſtate, they are ſhot by mariners; and their young, which run exceſſively faſt, are often taken. Labat has frequently taken them with nets, properly extended round the places they breed in. When their long legs are entangled in the meſhes, they are then unqualified to make their eſcape: but they ſtill continue to combat with their deſtroyer; and the old ones, though ſeized by

the head, will ſcratch with their claws; and theſe, though ſeemingly inoffenſive, very often do miſchief. When they are fairly diſengaged from the net, they nevertheleſs preſerve their natural ferocity; they refuſe all nouriſhment; they peck and combat with their claws at every opportunity. The fowler is therefore under a neceſſity of deſtroying them, when taken; as they would only pine and die, if left to themſelves in captivity. The fleſh of the old ones is black and hard; though, Dampier ſays, well taſted: that of the young ones is ſtill better. But, of all other delicacies, the flamingo's tongue is the moſt celebrated. A diſh of flamingo's tongues, ſays our author, is a feaſt for an emperor. In fact, the Roman emperors conſidered them as the higheſt luxury; and we have an account of one of them, who procured fifteen hundred flamingo's tongues to be ſerved up in a ſingle diſh. The tongue of this bird, which is ſo much ſought after, is a good deal larger than that of any other bird whatever. The bill of the flamingo is like a large black box, of an irregular figure, and filled with a tongue which is black and griſtly; but what peculiar flavour it may poſſeſs, I leave to be determined by ſuch as underſtand good eating better than I do. It is probable, that the

beauty and ſcarcity of the bird, might be the firſt inducements to ſtudious gluttony to fix upon its tongue as meat for the table. What Dampier ſays of the goodneſs of its fleſh, cannot ſo well be relied on; for Dampier was often hungry, and thought any thing good that could be eaten: he avers, indeed, with Labat, that the fleſh is black, tough and fiſhy; ſo that we can hardly give him credit, when he aſſerts, that its fleſh can be formed into a luxurious entertainment.

Theſe birds, as was ſaid, always go in flocks together; and they move in rank, in the manner of cranes. They are ſometimes ſeen, at the break of day, flying down in great numbers from the mountains; and conducting each other with a trumpet cry, that ſounds like the word Tococo, from whence the ſavages of Canada have given them the name. In their flight they appear to great advantage; for they then ſeem of as bright a red as a burning coal. When they diſpoſe themſelves to feed, their cry ceaſes; and then they diſperſe over a whole marſh, in ſilence and aſſiduity. Their manner of feeding is very ſingular: the bird thruſts down its head, ſo that the upper convex ſide of the bill ſhall only touch the ground; and in this poſition the animal appears, as it were, ſtanding upon

its head. In this manner it paddles and moves the bill about, and ſeizes whatever fiſh or inſect happens to offer. For this purpoſe the upper chap is notched at the edges, ſo as to hold its prey with the greater ſecurity. Cateſby, however, gives a different account of their feeding. According to him, they thus place the upper chap undermoſt, and ſo work about, in order to pick up a ſeed from the bottom of the water, that reſembles millet: but as in picking up this, they neceſſarily alſo ſuck in a great quantity of mud, their bill is toothed at the edges, in ſuch a manner as to let out the mud, while they ſwallow the grain.

Their time of breeding is according to the climate in which they reſide: in North America they breed in our ſummer; on the other ſide the line they take the moſt favourable ſeaſon of the year. They build their neſts in extenſive marſhes, and where they are in no danger of a ſurprize. The neſt is not leſs curious than the animal that builds it: it is raiſed from the ſurface of the pool about a foot and a half, formed of mud, ſcraped up together, and hardened by the ſun, or the heat of the bird's body: it reſembles a truncated cone, or one of the pots which we ſee placed on chimnies; on the top it

is hollowed out to the ſhape of the bird, and in that cavity the female lays her eggs, without any lining but the well cemented mud that forms the ſides of the building. She always lays two eggs, and no more; and, as her legs are immoderately long, ſhe ſtraddles on the neſt, while her legs hang down, one on each ſide, into the water.

The young ones are a long while before they are able to fly; but they run with amazing ſwiftneſs. They are ſometimes caught; and, very different from the old ones, ſuffer themſelves to be carried home, and are tamed very eaſily. In five or ſix days they become familiar, eat out of the hand, and drink a ſurprizing quantity of ſea-water. But though they are eaſily rendered domeſtic, they are not reared without the greateſt difficulty; for they generally pine away, for want of their natural ſupplies, and die in a ſhort time. While they are yet young, their colours are very different from thoſe lively tints they acquire with age. In their firſt year they are covered with plumage of a white colour, mixed with grey; in the ſecond year the whole body is white, with here and there a ſlight tint of ſcarlet; and the great covert feathers of the wings are black: the third year the bird acquires all its beauty; the

plumage of the whole body is ſcarlet, except ſome of the feathers in the wings, that ſtill retain their ſable hue. Of theſe beautiful plumes, the ſavages make various ornaments; and the bird is ſometimes ſkinned by the Europeans, to make muffs. But theſe have diminiſhed in their price, ſince we have obtained the art of dying feathers of the brighteſt ſcarlet.

CHAP.

## CHAP. IX.

### Of the Avoſetta or Scooper, and the Corrira or Runner.

THE extraordinary ſhape of the Avoſetta's bill might incline us to wiſh for its hiſtory; and yet in that we are not able to indulge the reader. Natural hiſtorians have hitherto, like ambitious monarchs, ſhewn a greater fondneſs for extending their dominions, than cultivating what they poſſeſs. While they have been labouring to add new varieties to their catalogues, they have neglected to ſtudy the hiſtory of animals already known.

The Avoſetta is chiefly found in Italy, and now and then comes over into England. It is about the ſize of a pigeon, is a pretty upright bird, and has extremely long legs for its ſize. But the moſt extraordinary part of its figure, and that by which it may be diſtinguiſhed from all others of the feathered tribe, is the bill, which turns up like a hook, in an oppoſite direction to that of the hawk or the parrot. This extraordinary bill is black, flat, ſharp and flexible at the end, and about three inches and an half long. From its being bare a long way

above the knee, it appears that it lives and wades in the waters. It has a chirping, pert note, as we are told; but with its other habits we are entirely unacquainted. I have placed it, from its ſlender figure, among the cranes; although it is web-footed, like the duck. It is one of thoſe birds of whoſe hiſtory we are yet in expectation.

To this bird of the crane kind, ſo little known, I will add another, ſtill leſs known; the Corrira or Runner, of Aldrovandus. All we are told of it is, that it has the longeſt legs of all web-footed fowls, except the flamingo and avoſetta; that the bill is ſtraight, yellow and black at the ends; that the pupils of the eyes are ſurrounded with two circles, one of which is bay, and the other white: below, near the belly, it is whitiſh; the tail, with two white feathers, black at the extremities; and that the upper part of the body is of the colour of ruſty iron. It is thus that we are obliged to ſubſtitute dry deſcription for inſtructive hiſtory; and employ words, to expreſs thoſe ſhadings of colour which the pencil alone can convey.

## CHAP. X.

### Of Small Birds of the Crane Kind, with the Thighs partly bare of Feathers.

AS I have taken my diſtinctions rather from the general form and manners of birds, than from their minuter though perhaps more preciſe diſcriminations, it will not be expected that I ſhould here enter into a particular hiſtory of a numerous tribe of birds, whoſe manners and forms are ſo very much alike. Of many of them we have ſcarce any account in our hiſtorians, but tedious deſcriptions of their dimenſions, and the colour of their plumage; and of the reſt, the hiſtory of one is ſo much that of all, that it is but the ſame account repeated to a moſt diſguſting reiteration. I will therefore groupe them into one general draught; in which the more eminent, or the moſt whimſical, will naturally ſtand forward on the canvas.

In this groupe we find an extenſive tribe of native birds, with their varieties and affinities; and we might add an hundred others, of diſtant climates, of which we know little more than the colour and the name. In this liſt is exhibited the Curlew, a bird of about the ſize

of a duck, with a bill four inches long: the Woodcock, about the ſize of a pigeon, with a bill three inches long: the Godwit, of the ſame ſize; the bill four inches: the Green Shank, longer legged; the bill two inches and an half: the Red Shank, differing in the colour of its feet from the former: the Snipe, leſs by half, with a bill three inches. Then with ſhorter bills—The Ruff, with a collar of feathers round the neck of the male; the Knot, the Sandpiper, the Sanderling, the Dunlin, the Purre and the Stint. To conclude; with bills very ſhort—The Lapwing, the Green Plover, the Grey Plover, the Dottrel, the Turnſtone and the Sea-lark. Theſe, with their affinities, are properly natives or viſitants of this country; and are diſperſed along our ſhores, rivers and watery grounds. Taking in the birds of this kind, belonging to other countries, the liſt would be very widely extended; and the whole of this claſs, as deſcribed by Briſſon, would amount to near an hundred.

All theſe birds poſſeſs many marks in common; though ſome have peculiarities that deſerve regard. All theſe birds are bare of feathers above the knee, or above the heel, as ſome naturaliſts chuſe to expreſs it. In fact, that part which I

call the knee, if compared with the legs of mankind, is analogous to the heel: but, as it is commonly conceived otherwiſe, I have conformed to the general apprehenſion. I ſay, therefore, that all theſe birds are bare of feathers above the knee; and in ſome they are wanting half way up the thigh. The nudity in that part, is partly natural, and partly produced by all birds of this kind habitually wading in water. The older the bird, the barer are its thighs; yet even the young ones have not the ſame downy covering reaching ſo low as the birds of any other claſs. Such a covering there would rather be prejudical, as being continually liable to get wet in the water.

As theſe birds are uſually employed rather in running than in flying, and as their food lies entirely upon the ground, and not on trees, or in the air, ſo they run with great ſwiftneſs for their ſize, and the length of their legs aſſiſts their velocity. But as, in ſeeking their food, they are often obliged to change their ſtation; ſo alſo are they equally ſwift of wing, and traverſe immenſe tracts of country without much fatigue.

It has been thought by ſome, that a part of this claſs lived upon an oily ſlime, found in

the bottoms of ditches and of weedy pools; they were thence termed, by Willoughby, Mud-ſuckers. But later diſcoveries have ſhewn that, in theſe places, they hunt for the caterpillars and worms of inſects. From hence, therefore, we may generally aſſert, that all birds of this claſs live upon animals of one kind or another. The long billed birds ſuck up worms and inſects from the bottom; thoſe furniſhed with ſhorter bills, pick up ſuch inſects as lie nearer the ſurface of the meadow, or among the ſands on the ſea-ſhore.

Thus the curlew, the wood-cock, and the ſnipe, are ever ſeen in plaſhy brakes, and under covered hedges, aſſiduouſly employed in ſeeking out inſects in their worm ſtate; and it ſeems, from their fatneſs, that they find a plentiful ſupply. Nature, indeed, has furniſhed them with very convenient inſtruments for procuring their food. Their bills are made ſufficiently long for ſearching; but ſtill more, they are endowed with an exquiſite ſenſibility at the point, for feeling their proviſion. They are furniſhed with no leſs than three pair of nerves, equal almoſt to the optic nerves in thickneſs; which paſs from the roof of the mouth, and run along the upper chap to the point.

Nor are thoſe birds with ſhorter bills, and

deſtitute of ſuch convenient inſtruments, without a proper proviſion made for their ſubſiſtence. The lapwing, the ſand-piper, and the red-ſhank, run with ſurprizing rapidity along the ſurface of the marſh, or the ſea-ſhore, quarter their ground with great dexterity, and leave nothing of the inſect kind that happens to lie on the ſurface. Theſe, however, are neither ſo fat nor ſo delicate as the former; as they are obliged to toil more for a ſubſiſtence, they are eaſily ſatisfied with whatever offers; and their fleſh often contracts a reliſh from what has been their lateſt, or their principal, food.

Moſt of the birds formerly deſcribed, have ſtated ſeaſons for feeding and reſt: the eagle kind prowl by day, and at evening repoſe; the owl by night, and keeps unſeen in the day-time. But theſe birds, of the crane kind, ſeem at all hours employed: they are ſeldom at reſt by day; and, during the whole night ſeaſon, every meadow and marſh reſounds with their different calls, to courtſhip or to food. This ſeems to be the time when they leaſt fear interruption from man; and though they fly at all times, yet, at this ſeaſon, they appear more aſſiduouſly employed, both in providing for their preſent ſupport, and continuing that of poſterity. This is uſually the ſeaſon when

the inſidious fowler ſteals in upon their occupations, and fills the whole meadow with terror and deſtruction.

As all of this kind live entirely in waters, and among watery places, they ſeem provided by Nature with a warmth of conſtitution to fit them for that cold element. They reſide, by choice, in the coldeſt climates; and as other birds migrate here in our ſummer, their migrations hither are moſtly in the winter. Even thoſe that reſide among us the whole ſeaſon, retire in ſummer to the tops of our bleakeſt mountains; where they breed, and bring down their young, when the cold weather ſets in.

Moſt of them, however, migrate, and retire to the polar regions; as thoſe that remain behind in the mountains, and keep with us during ſummer, bear no proportion to the quantity which in winter haunt our marſhes and low grounds. The ſnipe ſometimes builds here; and the neſt of the curlew is ſometimes found in the plaſhes of our hills: but the number of theſe is very ſmall; and it is moſt probable that they are only ſome ſtragglers who, not having ſtrength or courage ſufficient for the general voyage, take up from neceſſity their habitation here.

In general, during ſummer, this whole claſs

either chuſe the coldeſt countries to retire to, or the coldeſt and the moiſteſt part of ours to breed in. The curlew, the wood-cock, the ſnipe, the godwit, the grey plover, the green, and the long legged plover, the knot and the turnſtone, are rather the gueſts than the natives of this iſland. They viſit us in the beginning of winter, and forſake us in the ſpring. They then retire to the mountains of Sweden, Poland, Pruſſia, and Lapland, to breed. Our country, during the ſummer ſeaſon, becomes uninhabitable to them. The ground parched up by the heat; the ſprings dried away; and the vermicular inſects already upon the wing; they have no means of ſubſiſting. Their weak and delicately pointed bills are unfit to dig into a reſiſting ſoil; and their prey is departed, though they were able to reach its retreats. Thus, that ſeaſon when Nature is ſaid to teem with life, and to put on her gayeſt liveries, is to them an interval of ſterility and famine. The coldeſt mountains of the north are then a preferable habitation; the marſhes there are never totally dried up; and the inſects are in ſuch abundance, that, both above ground and underneath, the country ſwarms with them. In ſuch retreats, therefore, theſe birds would continue always; but that the froſts, when

they ſet in, have the ſame effect upon the face of the landſcape, as the heats of ſummer. Every brook is ſtiffened into ice; all the earth is congealed into one ſolid maſs; and the birds are obliged to forſake a region where they can no longer find ſubſiſtence.

Such are our viſitants. With regard to thoſe which keep with us continually, and breed here, they are neither ſo delicate in their food, nor perhaps ſo warm in their conſtitutions. The lapwing, the ruff, the red-ſhank, the ſand-piper, the ſea-pie, the Norfolk plover, and the ſea-lark, breed in this country, and, for the moſt part, reſide here. In ſummer they frequent ſuch marſhes as are not dried up in any part of the year; the Eſſex hundreds, and the fens of Lincolnſhire. There, in ſolitudes formed by ſurrounding marſhes, they breed and bring up their young. In winter they come down from their retreats, rendered uninhabitable by the flooding of the waters; and ſeek their food about our ditches and marſhy meadow-grounds. Yet even of this claſs, all are wanderers upon ſome occaſions; and take wing to the northern climates, to breed and find ſubſiſtence. This happens when our ſummers are peculiarly dry; and when the fenny countries are not ſufficiently watered to defend their retreats.

But though this be the uſual courſe of nature, with reſpect to theſe birds, they often break through the general habits of their kind; and as the lapwing, the ruff, and the ſand-piper, are ſometimes ſeen to alter their manners, and to migrate from hence, inſtead of continuing to breed here; ſo we often find the wood-cock, the ſnipe and the curlew, reſide with us during the whole ſeaſon, and breed their young in different parts of the country. In Caſewood, about two miles from Tunbridge, as Mr. Penant aſſures us, ſome wood-cocks are ſeen to breed annually. The young have been ſhot there in the beginning of Auguſt; and were as healthy and vigorous as they are with us in winter, though not ſo well taſted. On the Alps, and other high mountains, ſays Willoughby, the wood-cock continues all ſummer. I myſelf have fluſhed them on the top of Mount Jura, in June and July. The eggs are long, of a pale red colour, and ſtained with deeper ſpots and clouds. The neſts of the curlew and the ſnipe are frequently found; and ſome of theſe perhaps never entirely leave this iſland.

It is thus that the ſame habits are in ſome meaſure common to all; but in neſtling, and bringing up their young, one method takes place univerſally. As they all run and feed

upon the ground, ſo they are all found to neſtle there. The number of eggs generally to be ſeen in every neſt, is from two to four; never under, and very ſeldom exceeding. The neſt is made without any art; but the eggs are either laid in ſome little depreſſion of the earth, or on a few bents and long graſs, that ſcarcely preſerve them from the moiſture below. Yet ſuch is the heat of the body of theſe birds, that their time of incubation is ſhorter than with any others of the ſame ſize. The magpie, for inſtance, takes twenty-one days to hatch its young; the lapwing takes but fourteen. Whether the animal oil, with which theſe birds abound, gives them this ſuperior warmth, I cannot tell; but there is no doubt of their quick incubation.

In their ſeaſons of courtſhip, they pair as other birds; but not without violent conteſts between the males, for the choice of the female. The lapwing and the plover are often ſeen to fight among themſelves; but there is one little bird of this tribe, called the ruff, that has got the epithet of the fighter, merely from its great perſeverance and animoſity on theſe occaſions. In the beginning of ſpring, when theſe birds arrive among our marſhes, they are obſerved to engage with deſperate fury againſt each other; it is then that the fowlers,

ſeeing them intent on mutual deſtruction, ſpread their nets over them, and take them in great numbers. Yet even in captivity their animoſity ſtill continues: the people that fat them up for ſale, are obliged to ſhut them up in cloſe dark rooms; for if they let ever ſo little light in among them, the turbulent priſoners inſtantly fall to fighting with each other, and never ceaſe till each has killed its antagoniſt, eſpecially, ſays Willoughby, if any body ſtands by. A ſimilar animoſity, though in a leſs degree, prompts all this tribe; but when they have paired, and begun to lay, their contentions are then over.

The place theſe birds chiefly chuſe to breed in, is in ſome iſland ſurrounded with ſedgy moors, where men ſeldom reſort; and in ſuch ſituations I have often ſeen the ground ſo ſtrewed with eggs and neſts, that one could ſcarce take a ſtep, without treading upon ſome of them. As ſoon as a ſtranger intrudes upon theſe retreats, the whole colony is up, and an hundred different ſcreams are heard from every quarter. The arts of the lapwing to allure men or dogs from her neſt, are perfectly amuſing. When ſhe perceives the enemy approaching, ſhe never waits till they arrive at her neſt, but boldly runs to meet them: when ſhe has come

as near them as ſhe dares to venture, ſhe then riſes with a loud ſcreaming before them, ſeeming as if ſhe were juſt fluſhed from hatching; while ſhe is then probably a hundred yards from the neſt. Thus ſhe flies, with great clamour and anxiety, whining and ſcreaming round the invaders, ſtriking at them with her wings, and fluttering as if ſhe were wounded. To add to the deceit, ſhe appears ſtill more clamorous, as more remote from the neſt. If ſhe ſees them very near, ſhe then ſeems to be quite unconcerned, and her cries ceaſe, while her terrors are really augmenting. If there be dogs, ſhe flies heavily at a little diſtance before them, as if maimed; ſtill vociferous and ſtill bold, but never offering to move towards the quarter where her treaſure is depoſited. The dog purſues, in hopes every moment of ſeizing the parent, and by this means actually loſes the young; for the cunning bird, when ſhe has thus drawn him off to a proper diſtance, then puts forth her powers, and leaves her aſtoniſhed purſuer to gaze at the rapidity of her flight. The eggs of all theſe birds are highly valued by the luxurious; they are boiled hard, and thus ſerved up, without any further preparation.

As the young of this claſs are ſoon hatched, ſo, when excluded, they quickly arrive at ma-

turity. They run about after the mother as ſoon as they leave the egg; and being covered with a thick down, want very little of that clutching which all birds of the poultry kind, that follow the mother indiſpenſably require. They come to their adult ſtate long before winter; and then flock together, till the breeding ſeaſon returns, which for a while diſſolves their ſociety.

As the fleſh of almoſt all theſe birds is in high eſtimation, ſo many methods have been contrived for taking them. That uſed in taking the ruff, ſeems to be the moſt advantageous; and it may not be amiſs to deſcribe it. The Ruff, which is the name of the male, the Reeve that of the female, is taken in nets about forty yards long, and ſeven or eight feet high. Theſe birds are chiefly found in Lincolnſhire and the Iſle of Ely, where they come about the latter end of April, and diſappear about Michaelmas. The male of this bird, which is known from all others of the kind by the great length of the feathers round his neck, is yet ſo various in his plumage, that it is ſaid, no two ruffs were ever ſeen totally of the ſame colour. The nets in which theſe are taken, are ſupported by ſticks, at an angle of near forty-five degrees, and placed either on

dry ground, or in very ſhallow water, not remote from reeds: among theſe the fowler conceals himſelf, till the birds, enticed by a ſtale or ſtuffed bird, come under the nets: he then, by pulling a ſtring, lets them fall, and they are taken; as are godwits, knots and grey plover, alſo in the ſame manner. When theſe birds are brought from under the net, they are not killed immediately, but fattened for the table, with bread and milk, hemp-ſeed, and ſometimes boiled wheat; but if expedition be wanted, ſugar is added, which will make them a lump of fat in a fortnight's time. They are kept, as obſerved before, in a dark room; and judgment is required in taking the proper time for killing them, when they are at the higheſt pitch of fatneſs; for, if that is neglected, the birds are apt to fall away. They are reckoned a very great delicacy; they ſell for two ſhillings, or half a crown a piece; and are ſerved up to the table with the train, like wood-cocks, where we will leave them.

## CHAP. XI.

### Of the Water-hen and the Coot.

BEFORE we enter upon water-fowls, properly ſo called, two or three birds claim our attention, which ſeem to form the ſhade between the web-footed tribe and thoſe of the crane kind. Theſe partake rather of the form than the habits of the crane; and, though furniſhed with long legs and necks, rather ſwim than wade. They cannot properly be called web-footed; nor yet are they entirely deſtitute of membranes, which fringe their toes on each ſide, and adapt them for ſwimming. The birds in queſtion are, the Water-hen, and the Bald Coot.

Theſe birds have too near an affinity, not to be ranked in the ſame deſcription. They are ſhaped entirely alike, their legs are long, and their thighs partly bare; their necks are proportionable, their wings ſhort, their bills ſhort and weak, their colour black, their foreheads bald and without feathers, and their habits entirely the ſame. Theſe, however, naturaliſts have thought proper to range in different claſſes, from very ſlight diſtinctions in their

figure. The water-hen weighs but fifteen ounces; the coot twenty four. The bald part of the forehead in the coot is black; in the water-hen it is of a beautiful pink colour. The toes of the water-hen are edged with a ſtraight membrane; thoſe of the coot have it ſcolloped and broader.

The differences in the figure are but ſlight; and thoſe in their manner of living ſtill leſs. The hiſtory of the one will ſerve for both. As birds of the crane kind are furniſhed with long wings, and eaſily change place, the water-hen, whoſe wings are ſhort, is obliged to reſide entirely near thoſe places where her food lies: ſhe cannot take thoſe long journeys that moſt of the crane kind are ſeen to perform; compelled by her natural imperfections, as well perhaps as by inclination, ſhe never leaves the ſide of the pond or the river in which ſhe ſeeks for proviſion. Where the ſtream is ſelvaged with ſedges, or the pond edged with ſhrubby trees, the water-hen is generally a reſident there: ſhe ſeeks her food along the graſſy banks; and often along the ſurface of the water. With Shakeſpear's Edgar, ſhe drinks the green mantle of the ſtanding pool; or, at leaſt, ſeems to prefer thoſe places where it is ſeen. Whether ſhe makes pond-weed her food, or hunts among it

for water-inſects, which are found there in great abundance, is not certain. I have ſeen them when pond-weed was taken out of their ſtomach. She builds her neſt upon low trees and ſhrubs, of ſticks and fibres, by the water ſide. Her eggs are ſharp at one end, white, with a tincture of green ſpotted with red. She lays twice or thrice in a ſummer; her young ones ſwim the moment they leave the egg, purſue their parent, and imitate all her manners. She rears, in this manner, two or three broods in a ſeaſon; and when the young are grown up, ſhe drives them off to ſhift for themſelves.

As the coot is a larger bird, it is always ſeen in larger ſtreams, and more remote from mankind. The water-hen ſeems to prefer inhabited ſituations: ſhe keeps near ponds, motes, and pools of water near gentlemen's houſes; but the coot keeps in rivers, and among ruſhy margined lakes. It there makes a neſt of ſuch weeds as the ſtream ſupplies, and lays them among the reeds, floating on the ſurface, and riſing and falling with the water. The reeds among which it is built keep it faſt; ſo that it is ſeldom waſhed into the middle of the ſtream. But if this happens, which is ſometimes the caſe, the bird ſits in her neſt, like a mariner in his boat, and ſteers with her legs her cargo into

the neareſt harbour: there, having attained her port, ſhe continues to ſit in great tranquility, regardleſs of the impetuoſity of the current; and though the water penetrates her neſt, ſhe hatches her eggs in that wet condition.

The water-hen never wanders; but the coot ſometimes ſwims down the current, till it even reaches the ſea. In this voyage theſe birds encounter a thouſand dangers: as they cannot fly far, they are hunted by dogs and men; as they never leave the ſtream, they are attacked and deſtroyed by otters; they are preyed upon by kites and falcons; and they are taken, in ſtill greater numbers, in weirs made for catching fiſh; for theſe birds are led into the nets, while purſuing ſmall fiſh and inſects, which are their principal food. Thus animated nature affords a picture of univerſal invaſion! Man deſtroys the otter, the otter deſtroys the coot, the coot feeds upon fiſh, and fiſh are univerſally the tyrants of each other!

To theſe birds, with long legs and finny toes, I will add one ſpecies more, with ſhort legs and finny toes: I mean the Grebe. The entire reſemblance of this bird's appetites and manners to thoſe of the web-footed claſs, might juſtly induce me to rank it among them; but as it reſembles thoſe above deſcribed, in the pe-

culiar form of its toes, and bears ſome ſimilitude in its manners alſo, I will for once ſacrifice method to brevity. The grebe is much larger than either of the former, and its plumage white and black: it differs alſo entirely in the ſhortneſs of its legs, which are made for ſwimming, and not walking: in fact, they are from the knee upward hid in the belly of the bird, and have conſequently very little motion. By this mark, and by the ſcolloped fringe of the toes, may this bird be eaſily diſtinguiſhed from all others.

As they are thus, from the ſhortneſs of their wings, ill formed for flying, and from the uncommon ſhortneſs of their legs, utterly unfitted for walking, they ſeldom leave the water, and chiefly frequent thoſe broad ſhallow pools where their faculty of ſwimming can be turned to the greateſt advantage, in fiſhing and ſeeking their prey.

They are chiefly, in this country, ſeen to frequent the meres of Shropſhire and Cheſhire; where they breed among reeds and flags, in a floating neſt, kept ſteady by the weeds of the margin. The female is ſaid to be a careful nurſe of its young, being obſerved to feed them moſt aſſiduouſly with ſmall eels; and when the little brood is tired, the mother

will carry them, either on her back or under her wings. This bird preys upon fiſh, and is almoſt perpetually diving. It does not ſhew much more than the head above water; and is very difficult to be ſhot, as it darts down on the appearance of the leaſt danger. It is never ſeen on land; and, though diſturbed ever ſo often, will not leave that lake where alone, by diving and ſwimming, it can find food and ſecurity. It is chiefly ſought for the ſkin of its breaſt, the plumage of which is of a moſt beautiful ſilvery white, and as gloſſy as ſatin. This part is made into tippets; but the ſkins are out of ſeaſon about February, loſing their bright colour; and in breeding-time their breaſts are entirely bare.

PART

# PART VI.

## OF

# WATER-FOWL.

# CHAP. I.

## Of Water-fowl in General.

IN ſettling the diſtinctions among the other claſſes of birds, there was ſome difficulty; one tribe encroached ſo nearly upon the nature and habitudes of another, that it was not eaſy to draw the line which kept them aſunder: but in water-fowl Nature has marked them for us by a variety of indelible characters; ſo that it would be almoſt as unlikely to miſtake a land-fowl for one adapted for living and ſwimming among the waters, as a fiſh for a bird.

The firſt great diſtinction in this claſs, appears in the toes, which are webbed together for ſwimming. Thoſe who have remarked the feet or toes of a duck, will eaſily conceive how admirably they are formed for making way in the water. When men ſwim they do not open the fingers, ſo as to let the fluid paſs through them; but cloſing them together, preſent one broad ſurface to beat back the water, and thus puſh their bodies along. What man performs by art, Nature has ſupplied to water-fowl; and, by broad ſkins, has webbed their toes together, ſo that they expand

two broad oars to the water; and thus, moving them alternately, with the greateſt eaſe paddle along. We muſt obſerve alſo, that the toes are ſo contrived, that as they ſtrike backward, their broadeſt hollow ſurface beats the water; but as they gather them in again, for a ſecond blow, their front ſurface contracts, and does not impede the bird's progreſſive motion.

As their toes are webbed in the moſt convenient manner, ſo are their legs alſo made moſt fitly for ſwift progeſſion in the water. The legs of all are ſhort, except the three birds deſcribed in a former chapter; namely, the flamingo, the avoſetta, and the corrira: all which, for that reaſon, I have thought proper to rank among the crane kind, as they make little uſe of their toes in ſwimming. Except theſe, all web-footed birds have very ſhort legs; and theſe ſtrike, while they ſwim, with greater facility. Were the leg long, it would act like a lever whoſe prop is placed to a diſadvantage; its motions would be ſlow, and the labour of moving it conſiderable. For this reaſon, the very few birds whoſe webbed feet are long, never make uſe of them in ſwimming: the web at the bottom ſeems only of ſervice as a broad baſe, to prevent them from ſinking while they walk in the mud; but

it otherwiſe rather retards than advances their motion.

The ſhortneſs of the legs in the web-footed kinds, renders them as unfit for walking on land, as it qualifies them for ſwimming in their natural element. Their ſtay, therefore, upon land, is but ſhort and tranſitory; and they ſeldom venture to breed far from the ſides of thoſe waters where they uſually remain. In their breeding ſeaſons, their young are brought up by the water-ſide; and they are covered with a warm down, to fit them for the coldneſs of their ſituation. The old ones alſo have a cloſer, warmer plumage, than birds of any other claſs. It is of their feathers that our beds are compoſed; as they neither mat nor imbibe humidity, but are furniſhed with an animal-oil, that glazes their ſurface, and keeps each ſeparate. In ſome, however, this animal-oil is in too great abundance; and is as offenſive from its ſmell as it is ſerviceable for the purpoſes of houſehold oeconomy. The feathers, therefore, of all the penguin kind, are totally uſeleſs for domeſtic purpoſes; as neither boiling nor bleaching can diveſt them of their oily rancidity. Indeed, the rancidity of all new feathers, of whatever water-fowl they be, is ſo diſguſting, that our upholſterers give near

double the price for old feathers that they afford for new: to be free from ſmell, they muſt all be lain upon for ſome time; and their uſual method is to mix the new and the old together.

This quantity of oil, with which moſt water-fowl are ſupplied, contributes alſo to their warmth in the moiſt element where they reſide. Their ſkin is generally lined with fat; ſo that, with the warmth of the feathers externally, and this natural lining more internally, they are better defended againſt the changes or the inclemencies of the weather, than any other claſs whatever.

As, among land-birds, there are ſome found fitted entirely for depredation, and others for an harmleſs method of ſubſiſting upon vegetables, ſo alſo among theſe birds there are tribes of plunderers, that prey, not only upon fiſh, but ſometimes upon water-fowl themſelves. There are likewiſe more inoffenſive tribes, that live upon inſects and vegetables only. Some water-fowls ſubſiſt by making ſudden ſtoops from above, to ſeize whatever fiſh come near the ſurface; others again, not furniſhed with wings long enough to fit them for flight, take their prey by diving after it to the bottom.

From hence all water-fowl naturally fall into three diſtinctions. Thoſe of the Gull kind, that,

with long legs and round bills, fly along the ſurface to ſeize their prey. Thoſe of the Penguin kind, that, with round bills, legs hid in the abdomen, and ſhort wings, dive after their prey: and thirdly; thoſe of the Gooſe kind, with flat broad bills, that lead harmleſs lives, and chiefly ſubſiſt upon inſects and vegetables.

Theſe are not ſpeculative diſtinctions, made up for the arrangement of a ſyſtem; but they are ſtrongly and evidently marked by Nature. The Gull kind are active and rapacious; conſtantly, except when they breed, keeping upon the wing; fitted for a life of rapine, with ſharp ſtraight bills for piercing, or hooked at the end for holding their fiſhy prey. In this claſs we may rank the Albatroſs, the Cormorant, the Gannet or Soland Gooſe, the Shag, the Frigate Bird, the Great Brown Gull, and all the leſſer tribe of gulls and ſea-ſwallows.

The Penguin kind, with appetites as voracious, bills as ſharp, and equally eager for prey, are yet unqualified to obtain it by flight. Their wings are ſhort, and their bodies large and heavy, ſo that they can neither run nor fly. But they are formed for diving in a very peculiar manner. Their feet are placed ſo far backward, and their legs ſo hid in the abdomen,

that the ſlighteſt ſtroke ſends them head foremoſt to the bottom of the water. To this claſs we may refer the Penguin, the Auk, the Skout, the Sea-turtle, the Bottle-noſe and the Loon.

The Gooſe kind are eaſily diſtinguiſhable, by their flat broad bills, covered with a ſkin; and their manner of feeding, which is moſtly upon vegetables. In this claſs we may place the Swan, the Gooſe, the Duck, the Teal, the Widgeon, and all their numerous varieties.

In deſcribing the birds of theſe three claſſes, I will put the moſt remarkable of each claſs at the beginning of their reſpective tribes, and give their ſeparate hiſtory: then, after having deſcribed the chiefs of the tribe, the more ordinary ſorts will naturally fall in a body, and come under a general deſcription, behind their leaders. But before I offer to purſue this methodical arrangement, I muſt give the hiſtory of a bird that, from the ſingularity of its conformation, ſeems allied to no ſpecies; and ſhould therefore be ſeparately deſcribed. I mean the Pelican.

CHAP.

De Seve del.

Hy.c Taylor sculp.

1. Grebe.
2. Culterneb.
3. Pelican.

## CHAP. II.

### Of the Pelican.

THE Pelican of Africa is much larger in the body than a ſwan, and ſomewhat of the ſame ſhape and colour. Its four toes are all webbed together; and its neck in ſome meaſure reſembles that of a ſwan: but that ſingularity in which it differs from all other birds is in the bill and the great pouch underneath, which are wonderful, and demand a diſtinct deſcription. This enormous bill is fifteen inches from the point to the opening of the mouth, which is a good way back behind the eyes. At the baſe the bill is ſomewhat greeniſh, but varies towards the end, being of a reddiſh blue. It is very thick in the beginning, but tapers off to the end, where it hooks downwards. The under-chap is ſtill more extraordinary; for to the lower edges of it hang a bag, reaching the whole length of the bill to the neck, which is ſaid to be capable of containing fifteen quarts of water. This bag the bird has a power of wrinkling up into the hollow of the under-chap; but by opening the bill, and putting

one's hand down into the bag, it may be diſtended at pleaſure. The ſkin of which it is formed will then be ſeen of a bluiſh aſh-colour, with many fibres and veins running over its ſurface. It is not covered with feathers, but a ſhort downy ſubſtance as ſmooth and as ſoft as ſatin, and is attached all along the under edges of the chap, to be fixed backward to the neck of the bird by proper ligaments, and reaches near half way down. When this bag is empty it is not ſeen; but when the bird has fiſhed with ſucceſs, it is then incredible to what an extent it is often ſeen dilated. For the firſt thing the pelican does in fiſhing is to fill up the bag; and then it returns to digeſt its burthen at leiſure. When the bill is opened to its wideſt extent, a perſon may run his head into the bird's mouth, and conceal it in this monſtrous pouch, thus adapted for very ſingular purpoſes. Yet this is nothing to what Ruyſch aſſures us, who avers that a man has been ſeen to hide his whole leg, boot and all, in the monſtrous jaws of one of theſe animals. At firſt appearance this would ſeem impoſſible, as the ſides of the under chap, from which the bag depends, are not above an inch aſunder when the bird's bill is firſt opened; but then they are capable of great ſeparation; and it muſt neceſſarily be ſo

as the bird preys upon the largeſt fiſhes, and hides them by dozens in its pouch. Tertre affirms that it will hide as many fiſh as will ſerve ſixty hungry men for a meal.

Such is the formation of this extraordinary bird, which is a native of Africa and America. The pelican was once alſo known in Europe, particularly in Ruſſia; but it ſeems to have deſerted our coaſts. This is the bird of which ſo many fabulous accounts have been propagated; ſuch as its feeding its young with its own blood, and its carrying a proviſion of water for them in its great reſervoir in the deſart. But the abſurdity of the firſt account anſwers itſelf; and as for the latter, the pelican uſes its bag for very different purpoſes than that of filling it with water.

Its amazing pouch may be conſidered as analogous to the crop in other birds, with this difference, that as theirs lies at the bottom of the gullet, ſo this is placed at the top. Thus, as pigeons and other birds macerate their food for their young in their crops, and then ſupply them, ſo the pelican ſupplies its young by a more ready contrivance, and macerates their food in its bill, or ſtores it for its own particular ſuſtenance.

The ancients were particularly fond of giving

this bird admirable qualities and parental affections; ſtruck, perhaps, with its extraordinary figure, they were willing to ſupply it with as extraordinary appetites; and having found it with a large reſervoir, they were pleaſed with turning it to the moſt tender and parental uſes. But the truth is, the pelican is a very heavy, ſluggiſh, voracious bird, and very ill fitted to take thoſe flights, or to make thoſe cautious proviſions for a diſtant time, which we have been told they do. Father Labat, who ſeems to have ſtudied their manners with great exactneſs, has given us a minute hiſtory of this bird, as found in America; and from him I will borrow mine.

The pelican, ſays Labat, has ſtrong wings, furniſhed with thick plumage of an aſh-colour, as are the reſt of the feathers over the whole body. Its eyes are very ſmall, when compared to the ſize of its head; there is a ſadneſs in its countenance, and its whole air is melancholly. It is as dull and reluctant in its motions, as the flamingo is ſprightly and active. It is ſlow of flight; and when it riſes to fly, performs it with difficulty and labour. Nothing, as it would ſeem, but the ſpur of neceſſity, could make theſe birds change their ſituation, or induce them to aſcend into the air: but they muſt either ſtarve or fly.

They are torpid and inactive to the laſt degree, ſo that nothing can exceed their indolence but their gluttony; it is only from the ſtimulations of hunger that they are excited to labour; for otherwiſe they would continue always in fixed repoſe. When they have raiſed themſelves about thirty or forty feet above the ſurface of the ſea, they turn their head with one eye downwards, and continue to fly in that poſture. As ſoon as they perceive a fiſh ſufficiently near the ſurface, they dart down upon it with the ſwiftneſs of an arrow, ſeize it with unerring certainty, and ſtore it up in their pouch. They then riſe again, though not without great labour, and continue hovering and fiſhing, with their head on one ſide as before.

This work they continue with great effort and induſtry till their bag is full, and then they fly to land to devour and digeſt at leiſure the fruits of their induſtry. This, however, it would appear they are not long performing; for towards night they have another hungry call; and they again reluctantly go to labour. At night, when their fiſhing is over, and the toil of the day crowned with ſucceſs, theſe lazy birds retire a little way from the ſhore; and, though with the webbed feet and clumſy figure of a gooſe, they will be contented to perch no where but upon trees

among the light and airy tenants of the foreſt. There they take their repoſe for the night; and often ſpend a great part of the day, except ſuch times as they are fiſhing, ſitting in diſmal ſolemnity, and as it would ſeem half aſleep. Their attitude is, with the head reſting upon their great bag, and that reſting upon their breaſt. There they remain without motion, or once changing their ſituation, till the calls of hunger break their repoſe, and till they find it indiſpenſibly neceſſary to fill their magazine for a freſh meal. Thus their life is ſpent between ſleeping and eating; and our author adds, that they are as foul as they are voracious, as they are every moment voiding excrements in heaps as large as one's fiſt.

The ſame indolent habits ſeem to attend them even in preparing for incubation, and defending their young when excluded. The female makes no preparation for her neſt, nor ſeems to chuſe any place in preference to lay in; but drops her eggs on the bare ground to the number of five or ſix, and there continues to hatch them. Attached to the place, without any deſire of defending her eggs or her young, ſhe tamely ſits and ſuffers them to be taken from under her. Now and then ſhe juſt ventures to peck, or to cry out when a perſon offers to beat her off.

She feeds her young with fiſh macerated for ſome time in her bag; and when they cry flies off for a new ſupply. Labat tells us that he took two of theſe when very young, and tied them by the leg to a poſt ſtuck into the ground, where he had the pleaſure of ſeeing the old one for ſeveral days come to feed them, remaining with them the greateſt part of the day, and ſpending the night on the branch of a tree that hung over them. By theſe means they were all three become ſo familiar, that they ſuffered themſelves to be handled; and the young ones very kindly accepted whatever fiſh he offered them. Theſe they always put firſt into their bag, and then ſwallowed at their leiſure.

It ſeems, however, that they are but diſagreeable and uſeleſs domeſtics; their gluttony can ſcarcely be ſatisfied; their fleſh ſmells very rancid; and taſtes a thouſand times worſe than it ſmells. The native Americans kill vaſt numbers; not to eat, for they are not fit even for the banquet of a ſavage; but to convert their large bags into purſes and tobacco-pouches. They beſtow no ſmall pains in dreſſing the ſkin with ſalt and aſhes, rubbing it well with oil, and then forming it to their purpoſe. It thus becomes ſo ſoft and pliant, that the Spaniſh women ſometimes adorn it

with gold and embroidery to make work-bags of.

Yet, with all the ſeeming hebetude of this bird, it is not entirely incapable of inſtruction in a domeſtic ſtate. Father Raymond aſſures us, that he has ſeen one ſo tame and well educated among the native Americans, that it would go off in the morning at the word of command, and return before night to its maſter, with its great paunch diſtended with plunder; a part of which the ſavages would make it diſgorge, and a part they would permit it to reſerve for itſelf.

"The Pelican," as Faber relates, "is not "deſtitute of other qualifications. One of thoſe "which was brought alive to the Duke of Ba-"varia's court, where it lived forty years, ſeemed "to be poſſeſſed of very uncommon ſenſations. "It was much delighted in the company and "converſation of men, and in muſic both vocal "and inſtrumental; for it would willingly "ſtand," ſays he, "by thoſe that ſung or "ſounded the trumpet; and ſtretching out "its head, and turning its ear to the muſic, "liſtened very attentively to its harmony, "though its own voice was little pleaſanter than "the braying of an aſs." Geſner tells us that the emperor Maximilian had a tame pelican

which lived for above eighty years, and that always attended his army on their march. It was one of the largeſt of the kind, and had a daily allowance by the emperor's orders. As another proof of the great age to which the pelican lives, Aldrovandus makes mention of one of theſe birds that was kept ſeveral years at Mechlin, and was verily believed to be fifty years old.—We often ſee theſe birds at our ſhews about town.

CHAP.

## CHAP. III.

### Of the Albatroſs, the firſt of the Gull Kind.

THOUGH this is one of the largeſt and moſt formidable birds of Africa and America, yet we have but few accounts to enlighten us in its hiſtory. The figure of the bird is thus deſcribed by Edwards. "The body is rather "larger than that of the pelican; and its "wings when extended ten feet from tip to "tip. The bill, which is ſix inches long, is "yellowiſh, and terminates in a crooked point. "The top of the head is of a bright brown; the "back is of a dirty deep ſpotted brown; and "the belly and under the wings is white; the "toes, which are webbed, are of a fleſh "colour."

Such are the principal traits in this bird's figure: but theſe lead us a very ſhort way in its hiſtory; and our naturaliſts have thought fit to ſay nothing more. However, I am apt to believe this bird to be the ſame with that deſcribed by Wicquefort, under the title of the Alcatraz; its ſize, its colours, and its prey incline me to think ſo. He deſcribes it as a kind of great gull, as large in the body as a

gooſe, of a brown colour, with a long bill, and living upon fiſh, of which they kill great numbers.

This bird is an inhabitant of the tropical climates, and alſo beyond them as far as the Streights of Magellan in the South Seas. It is one of the moſt fierce and formidable of the aquatic tribe, not only living upon fiſh, but alſo ſuch ſmall water-fowl as it can take by ſurprize. It preys, as all the gull-kind do, upon the wing; and chiefly purſues the flying-fiſh, that are forced from the ſea by the dolphins. The ocean in that part of the world preſents a very different appearance from the ſeas with which we are ſurrounded. In our ſeas we ſee nothing but a dreary expanſe, ruffled by winds, and ſeemingly forſaken by every claſs of animated nature. But the tropical ſeas, and the diſtant ſouthern latitudes beyond them, are all alive with birds and fiſhes, purſuing and purſued. Every various ſpecies of the gull-kind are there ſeen hovering on the wing, at a thouſand miles diſtance from the ſhore. The flying fiſh are every moment riſing to eſcape from their purſuers of the deep, only to encounter equal dangers in the air. Juſt as they riſe the dolphin is ſeen to dart after them, but generally in vain; the gull has more frequent ſucceſs, and often takes them at their

riſe; while the albatroſs purſues the gull, and obliges it to relinquiſh its prey: ſo that the whole horizon preſents but one living picture of rapacity and evaſion.

So much is certain; but how far we are to credit Wicquefort, in what he adds concerning this bird, the reader is left to determine "As theſe birds, except when they breed, "live entirely remote from land, ſo they are "often ſeen, as it ſhould ſeem, ſleeping in the "air. At night, when they are preſſed by "ſlumber, they riſe into the clouds as high as "they can; there, putting their head under "one wing, they beat the air with the other, "and ſeem to take their eaſe. After a time, "however, the weight of their bodies, only thus "half ſupported, brings them down; and they "are ſeen deſcending, with a pretty rapid "motion, to the ſurface of the ſea. Upon this "they again put forth their efforts to riſe; "and thus alternately aſcend and deſcend at "their eaſe. But it ſometimes happens," ſays my author, "that, in theſe ſlumbering "flights, they are off their guard, and fall "upon deck, where they are taken."

What truth there may be in this account, I will not take it upon me to determine; but certain it is, that few birds float upon the air

with more eaſe than the albatroſs, or ſupport themſelves a longer time in that element. They ſeem never to feel the acceſſes of fatigue; but night and day upon the wing are always prowling, yet always emaciated and hungry.

But though this bird be one of the moſt formidable tyrants of the deep, there are ſome aſſociations which even tyrants themſelves form, to which they are induced either by caprice or neceſſity. The albatroſs ſeems to have a peculiar affection for the penguin, and a pleaſure in its ſociety. They are always ſeen to chuſe the ſame places for breeding; ſome diſtant, uninhabited iſland, where the ground ſlants to the ſea, as the penguin is not formed either for flying or climbing. In ſuch places their neſts are ſeen together, as if they ſtood in need of mutual aſſiſtance and protection. Captain Hunt, who for ſome time commanded at our ſettlement upon Falkland Iſlands, aſſures me, that he was often amazed at the union preſerved between theſe birds, and the regularity with which they built together. In that bleak and deſolate ſpot, where the birds had long continued undiſturbed poſſeſſors, and no way dreaded the encroachments of men, they ſeemed to make their abode as comfortable as they expected it to be laſting. They were ſeen to

build with an amazing degree of uniformity; their neſts covering fields by thouſands, and reſembling a regular plantation. In the middle, on high, the albatroſs raiſed its neſt, on heath ſticks and long graſs, about two feet above the ſurface: round this the penguins made their lower ſettlements, rather in holes in the ground; and moſt uſually eight penguins to one albatroſs. Nothing is a ſtronger proof of Mr. Buffon's fine obſervation, that the preſence of man not only deſtroys the ſociety of meaner animals, but their inſtincts alſo. Theſe neſts are now, I am told, totally deſtroyed; the ſociety is broke up; and albatroſs and penguin have gone to breed upon more deſert ſhores, in greater ſecurity.

CHAP.

## CHAP. IV.

### The Cormorant.

THE Cormorant is about the ſize of a large Muſcovy duck, and may be diſtinguiſhed from all other birds of this kind, by its four toes being united by membranes together; and by the middle toe being toothed or notched, like a ſaw, to aſſiſt it in holding its fiſhy prey. The head and neck of this bird are of a ſooty blackneſs; and the body thick and heavy, more inclining in figure to that of the gooſe than the gull. The bill is ſtraight, till near the end, where the upper chap bends into a hook.

But notwithſtanding the ſeeming heavineſs of its make, there are few birds more powerfully predaceous. As ſoon as the winter approaches, they are ſeen diſperſed along the ſea-ſhore, and aſcending up the mouths of freſh-water rivers, carrying deſtruction to all the finny tribe. They are moſt remarkably voracious, and have a moſt ſudden digeſtion. Their appetite is for ever craving, and never ſatisfied. This gnawing ſenſation may probably be encreaſed by the great quantity of ſmall worms that fill their inteſtines, and which their unceaſing gluttony contributes to engender.

Thus formed with the groſſeſt appetites, this unclean bird has the moſt rank and diſagreeable ſmell, and is more fœtid than even carrion, when in its moſt healthful ſtate. Its form, ſays an ingenious modern, is diſagreeable; its voice is hoarſe and croaking; and all its qualities obſcene. No wonder then that Milton ſhould make Satan perſonate this bird, when he ſent him upon the baſeſt purpoſes, to ſurvey with pain the beauties of Paradiſe, and to ſit deviſing death on the tree of life *. It has been remarked, however, of our poet, that the making a water-fowl perch on a tree, implied no great acquaintance with the hiſtory of nature. In vindication of Milton, Ariſtotle expreſsly ſays, that the cormorant is the only water-fowl that ſits on trees. We have already ſeen the pelican of this number; and the cormorant's toes ſeem as fit for perching upon trees as for ſwimming; ſo that our epic bard ſeems to have been as deeply verſed in natural hiſtory as in criticiſm.

Indeed, this bird ſeems to be of a multiform nature; and wherever fiſh are to be found, watches their migrations. It is ſeen as well by land as ſea; it fiſhes in freſh-water lakes, as well as in the depths of the ocean; it builds

* Vide Penant's Zoology, p. 477.

in the cliffs of rocks, as well as on trees; and preys not only in the day-time, but by night.

Its indefatigable nature, and its great power in catching fiſh, were probably the motives that induced ſome nations to breed this bird up tame, for the purpoſes of fiſhing; and Willoughby aſſures us, it was once uſed in England for that purpoſe. The deſcription of their manner of fiſhing is thus delivered by Faber. "When they carry them out of the rooms "where they are kept, to the fiſh-pools, they "hood-wink them, that they may not be frighted by the way. When they are come to "the rivers, they take off their hoods; and "having tied a leather thong round the lower "part of their necks, that they may not "ſwallow down the fiſh they catch, they throw "them into the river. They preſently dive "under water; and there, for a long time, "with wonderful ſwiftneſs, purſue the fiſh; "and when they have caught them, riſe "to the top of the water, and preſſing the "fiſh lightly with their bills, ſwallow them; "till each bird hath, after this manner, devoured five or ſix fiſhes. Then their keepers "call them to the fiſt, to which they readily "fly; and, one after another, vomit up all "their fiſh, a little bruiſed with the firſt nip

" given in catching them. When they have " done fiſhing, ſetting the birds on ſome high " place, they looſe the ſtring from their necks, " leaving the paſſage to the ſtomach free and " open; and, for their reward, they throw " them part of their prey; to each one or two " fiſhes, which they will catch moſt dexterouſly, " as they are falling in the air."

At preſent, the cormorant is trained up in every part of China for the ſame purpoſe, where there are many lakes and canals. " To this " end," ſays Le Comte, " they are educated " as men rear up ſpaniels or hawks; and one " man can eaſily manage an hundred. The " fiſher carries them out into the lake, perched " on the gunnel of his boat, where they con- " tinue tranquil, and expecting his orders with " patience. When arrived at the proper place, " at the firſt ſignal given each flies a different " way, to fulfil the taſk aſſigned it. It is very " pleaſant, on this occaſion, to behold with " what ſagacity they portion out the lake or " the canal where they are upon duty. They " hunt about, they plunge, they riſe an hun- " dred times to the ſurface, until they have at " laſt found their prey. They then ſeize it " with their beak by the middle, and carry it " without fail to their maſter. When the fiſh

"is too large, they then give each other mu-
"tual aſſiſtance: one ſeizes it by the head, the
"other by the tail, and in this manner carry
"it to the boat together. There the boat-man
"ſtretches out one of his long oars, on which
"they perch, and being delivered of their bur-
"then, they fly off to purſue their ſport. When
"they are wearied, he lets them reſt for a
"while; but they are never fed till their work
"is over. In this manner they ſupply a very
"plentiful table; but ſtill their natural gluttony
"cannot be reclaimed even by education.
"They have always, while they fiſh, the ſame
"ſtring faſtened round their throats, to prevent
"them from devouring their prey, as otherwiſe
"they would at once ſatiate themſelves, and
"diſcontinue their purſuit the moment they
"had filled their bellies."

As for the reſt, the cormorant is the beſt fiſher of all birds; and though fat and heavy with the quantity it devours, is nevertheleſs generally upon the wing. The great activity with which it purſues, and from a vaſt height drops down to dive after its prey, offers one of the moſt amuſing ſpectacles to thoſe who ſtand upon a cliff on the ſhore. This large bird is ſeldom ſeen in the air, but where there are fiſh below; but then they muſt be near the

ſurface, before it will venture to ſouſe upon them. If they are at a depth beyond what the impetus of its flight makes the cormorant capable of diving to, they certainly eſcape him; for this bird cannot move ſo faſt under water, as the fiſh can ſwim. It ſeldom, however, makes an unſucceſsful dip; and is often ſeen riſing heavily, with a fiſh larger than it can readily devour. It ſometimes alſo happens, that the cormorant has caught the fiſh by the tail; and conſequently the fins prevent its being eaſily ſwallowed in that poſition. In this caſe, the bird is ſeen to toſs its prey above its head, and very deterouſly to catch it, when deſcending, by the proper end, and ſo ſwallow it with eaſe.

CHAP.

## CHAP. V.

### Of the Gannet or Soland Gooſe.

THE Gannet is of the ſize of a tame gooſe, but its wings much longer, being ſix feet over. The bill is ſix inches long, ſtraight almoſt to the point, where it inclines down, and the ſides are irregularly jagged, that it may hold its prey with greater ſecurity. It differs from the cormorant in ſize, being larger; in its colour, which is chiefly white; and by its having no noſtrils, but in their place a long furrow that reaches almoſt to the end of the bill. From the corner of the mouth is a narrow ſlip of black bare ſkin, that extends to the hind part of the head; beneath the ſkin is another that, like the pouch of the pelican, is dilatable, and of ſize ſufficient to contain five or ſix entire herrings, which in the breeding ſeaſon it carries at once to its mate or its young.

Theſe birds, which ſubſiſt entirely upon fiſh, chiefly reſort to thoſe uninhabited iſlands where their food is found in plenty, and men ſeldom come to diſturb them. The iſlands to the north of Scotland, the Skelig iſlands of the coaſts of Kerry, in Ireland, and thoſe

that lie in the north ſea off Norway, abound with them. But it is on the Baſs iſland, in the Firth of Edinburgh, where they are ſeen in the greateſt abundance. "There is a ſmall iſland," ſays the celebrated Harvey, "called the Baſs, "not more than a mile in circumference. "The ſurface is almoſt wholly covered during "the months of May and June with their neſts, "their eggs and young. It is ſcarcely poſſible "to walk without treading on them: the flocks "of birds upon the wing, are ſo numerous, "as to darken the air like a cloud; and their "noiſe is ſuch, that one cannot, without dif- "ficulty, be heard by the perſon next to him. "When one looks down upon the ſea from "the precipice, its whole ſurface ſeems covered "with infinite numbers of birds of different "kinds, ſwimming and purſuing their prey. "If, in ſailing round the iſland, one ſurveys "its hanging cliffs, in every crag or fiſſure "of the broken rocks, may be ſeen innume- "rable birds, of various ſorts and ſizes, more "than the ſtars of heaven, when viewed in a "ſerene night. If they are viewed at a diſtance, "either receding, or in their approach to the "iſland, they ſeem like one vaſt ſwarm of "bees."

They are not leſs frequent upon the rocks

of St. Kilda. Martin aſſures us, that the inhabitants of that ſmall iſland conſume annually near twenty-three thouſand young birds of this ſpecies, beſides an amazing quantity of their eggs. On theſe they principally ſubſiſt throughout the year; and from the number of theſe viſitants, make an eſtimate of their plenty for the ſeaſon. They preſerve both the eggs and fowls in ſmall pyramidal ſtone buildings, covering them with turf-aſhes, to prevent the evaporation of their moiſture.

The gannet is a bird of paſſage. In winter it ſeeks the more ſouthern coaſts of Cornwall, hovering over the ſhoals of herrings and pilchards that then come down from the northern ſeas: its firſt appearance in the northern iſlands, is in the beginning of ſpring; and it continues to breed till the end of ſummer. But, in general, its motions are determined by the migrations of the immenſe ſhoals of herrings that come pouring down at that ſeaſon through the Britiſh Channel, and ſupply all Europe as well as this bird with their ſpoil. The gannet aſſiduouſly attends the ſhoal in their paſſage, keeps with them in their whole circuit round our iſland, and ſhares with our fiſhermen this exhauſtleſs banquet. As it is ſtrong of wing, it never comes near the land; but is conſtant

to its prey. Wherever the gannet is ſeen, it is ſure to announce to the fiſhermen the arrival of the finny tribe; they then prepare their nets, and take the herrings by millions at a draught; while the gannet, who came to give the firſt information, comes, though an unbidden gueſt, and often ſnatches its prey from the fiſherman even in his boat. While the fiſhing ſeaſon continues, the gannets are buſily employed; but when the pilchards diſappear from our coaſts, the gannet takes its leave, to keep them company.

The cormorant has been remarked for the quickneſs of his ſight; yet in this the gannet ſeems to exceed him. It is poſſeſſed of a tranſparent membrane under the eye-lid, with which it covers the whole eye at pleaſure, without obſcuring the ſight in the ſmalleſt degree. This ſeems a neceſſary proviſion for the ſecurity of the eyes of ſo weighty a creature, whoſe method of taking prey, like that of the cormorant, is by darting headlong down from an height of an hundred feet and more into the water to ſeize it. Theſe birds are ſometimes taken at ſea, by faſtening a pilchard to a board, which they leave floating. The gannet inſtantly pounces down from above upon the board, and is killed or maimed by the ſhock of a body where it expected no reſiſtance.

Theſe birds breed but once a year, and lay but one egg, which being taken away, they lay another; if that is alſo taken, then a third; but never more for that ſeaſon. Their egg is white, and rather leſs than that of the common gooſe; and their neſt large, compoſed of ſuch ſubſtances as are found floating on the ſurface of the ſea. The young birds, during the firſt year, differ greatly in colour from the old ones; being of a duſky hue, ſpeckled with numerous triangular white ſpots; and at that time reſembling the colours of the ſpeckled diver.

The Baſs Iſland, where they chiefly breed, belongs to one proprietor; ſo that care is taken never to fright away the birds when laying, or to ſhoot them upon the wing. By that means, they are ſo confident as to alight and feed their young ones cloſe beſide you. They feed only upon fiſh, as was obſerved; yet the young gannet is counted a great dainty by the Scots, and ſold very dear; ſo that the lord of the iſlet makes a conſiderable annual profit by the ſale.

CHAP.

## CHAP. VI.

### Of ſmaller Gulls and Petrels.

HAVING deſcribed the manners of the great ones of this tribe, thoſe of the ſmaller kinds may be eaſily inferred. They reſemble the more powerful in their appetites for prey, but have not ſuch certain methods of obtaining it. In general, therefore, the induſtry of this tribe and their audacity encreaſe in proportion to their imbecility; the great gulls live at the moſt remote diſtance from man; the ſmaller are obliged to reſide wherever they can take their prey; and to come into the moſt populous places when ſolitude can no longer grant them a ſupply. In this claſs we may place the Gull, properly ſo called, of which there are above twenty different kinds; the Petrel, of which there are three; and the Sea-ſwallow, of which there are as many. The gulls may be diſtinguiſhed by an angular knob on the lower-chap; the petrels by their wanting this knob; and the ſea-ſwallow by their bills, which are ſtraight, ſlender, and ſharp pointed. They all, however, agree in their appetites and their places of abode.

The gull, and all its varieties, is very well

known in every part of the kingdom. It is ſeen with a ſlow-ſailing flight hovering over rivers to prey upon the ſmaller kinds of fiſh; it is ſeen following the plowman in fallow fields to pick up inſects; and when living animal food does not offer, it has even been known to eat carrion and whatever elſe of the kind that offers. Gulls are found in great plenty in every place; but it is chiefly round our boldeſt rockieſt ſhores that they are ſeen in the greateſt abundance; it is there that the gull breeds and brings up its young; it is there that millions of them are heard ſcreaming with diſcordant notes for months together.

Thoſe who have been much upon our coaſts know that there are two different kinds of ſhores; that which ſlants down to the water with a gentle declivity, and that which riſes with a precipitate boldneſs, and ſeems ſet as a bulwark to repel the force of the invading deeps. It is to ſuch ſhores as theſe that the whole tribe of the gull-kind reſort, as the rocks offer them a retreat for their young, and the ſea a ſufficient ſupply. It is in the cavities of theſe rocks, of which the ſhore is compoſed, that the vaſt variety of ſea-fowls retire to breed in ſafety. The waves beneath, that continually beat at the baſe, often wear

the ſhore into an impending boldneſs; ſo that it ſeems to jut out over the water, while the raging of the ſea makes the place inacceſſible from below. Theſe are the ſituations to which ſea-fowl chiefly reſort, and bring up their young in undiſturbed ſecurity.

Thoſe who have never obſerved our boldeſt coaſts have no idea of their tremendous ſublimity. The boaſted works of art, the higheſt towers, and the nobleſt domes, are but ant-hills when put in compariſon: the ſingle cavity of a rock often exhibits a coping higher than the cieling of a gothic cathedral. The face of the ſhore offers to the view a wall of maſſive ſtone ten times higher than our talleſt ſteeples. What ſhould we think of a precipice three quarters of a mile in height; and yet the rocks of St. Kilda are ſtill higher! What muſt be our awe to approach the edge of that impending height, and to look down on the unfathomable vacuity below; to ponder on the terrors of falling to the bottom, where the waves that ſwell like mountains are ſcarcely ſeen to curl on the ſurface, and the roar of an ocean a thouſand leagues broad appears ſofter than the murmur of a brook! It is in theſe formidable manſions that myriads of ſea-fowls are for ever ſeen ſporting, flying in ſecurity down the depth, half a mile

beneath the feet of the ſpectator. The crow and the chough avoid thoſe frightful precipices; they chuſe ſmaller heights, where they are leſs expoſed to the tempeſt; it is the cormorant, the gannet, the tarrock, and the terne, that venture to theſe dreadful retreats, and claim an undiſturbed poſſeſſion. To the ſpectator from above, thoſe birds, though ſome of them are above the ſize of an eagle, ſeem ſcarce as large as a ſwallow; and their loudeſt ſcreaming is ſcarce perceptible.

But the generality of our ſhores are not ſo formidable. Though they may riſe two hundred fathom above the ſurface, yet it often happens that the water forſakes the ſhore at the departure of the tide, and leaves a noble and delightful walk for curioſity on the beach. Not to mention the variety of ſhells with which the ſand is ſtrewed, the lofty rocks that hang over the ſpectator's head, and that ſeem but juſt kept from falling, produce in him no unpleaſing gloom. If to this be added the fluttering, the ſcreaming, and the purſuits of myriads of water-birds, all either intent on the duties of incubation, or rouzed at the preſence of a ſtranger, nothing can compoſe a ſcene of more peculiar ſolemnity. To walk along the ſhore when the tide is departed, or to ſit in the hollow

of a rock when it is come in, attentive to the various ſounds that gather on every ſide, above and below, may raiſe the mind to its higheſt and nobleſt exertions. The ſolemn roar of the waves ſwelling into and ſubſiding from the vaſt caverns beneath, the piercing note of the gull, the frequent chatter of the guillemot, the loud note of the auk, the ſcream of the heron, and the hoarſe deep periodical croaking of the cormorant, all unite to furniſh out the grandeur of the ſcene, and turn the mind to him who is the Eſſence of all ſublimity.

Yet it often happens that the contemplation of a ſea-ſhore produces ideas of an humbler kind, yet ſtill not unpleaſing. The various arts of theſe birds to ſeize their prey, and ſometimes to elude their purſuers, their ſociety among each other, and their tenderneſs and care of their young, produce gentler ſenſations. It is ridiculous alſo now and then to ſee their various ways of impoſing upon each other. It is common enough, for inſtance, with the arctic gull, to purſue the leſſer gulls ſo long, that they drop their excrements through fear, which the hungry hunter quickly gobbles up before it ever reaches the water. In breeding too they have frequent conteſts: one bird who has no neſt of her own attempts to diſpoſſeſs another,

and put herſelf in the place. This often happens among all the gull-kind; and I have ſeen the poor bird, thus diſplaced by her more powerful invader, ſit near the neſt in penſive diſcontent, while the other ſeemed quite comfortable in her new habitation. Yet this place of pre-eminence is not eaſily obtained; for the inſtant the invader goes to ſnatch a momentary ſuſtenance, the other enters upon her own, and always ventures another battle before ſhe relinquiſhes the juſtneſs of her claim. The contemplation of a cliff thus covered with hatching-birds affords a very agreeable entertainment; and as they ſit upon the ledges of the rocks, one above another, with their white breaſts forward, the whole groupe has not unaptly been compared to an apothecary's ſhop.

Theſe birds, like all others of the rapacious kind, lay but few eggs; and hence, in many places, their number is daily ſeen to diminiſh. The leſſening of ſo many rapacious birds may, at firſt ſight, appear a benefit to mankind; but when we conſider how many of the natives of our iſlands are ſuſtained by their fleſh, either freſh or ſalted, we ſhall find no ſatisfaction in thinking that thoſe poor people may in time loſe their chief ſupport. The gull in general, as was ſaid, builds on the ledges of

rocks, and lays from one egg to three, in a neſt formed of long graſs and ſea-weed. Moſt of the kind are fiſhy taſted, with black ſtringy fleſh; yet the young ones are better food: and of theſe, with ſeveral other birds of the penguin kind, the poor inhabitants of our northern iſlands make their wretched banquets. They have been long uſed to no other food; and even ſalted gull can be reliſhed by thoſe who know no better. Almoſt all delicacy is a relative thing; and the man who repines at the luxuries of a well-ſerved table, ſtarves not for want but from compariſon. The luxuries of the poor are indeed coarſe to us, yet ſtill they are luxuries to thoſe ignorant of better; and it is probable enough that a Kilda or a Feroe man may be found to exiſt, outdoing Apicius himſelf, in conſulting the pleaſures of the table. Indeed, if it be true that ſuch meat as is the moſt dangerouſly earned is the ſweeteſt, no men can dine ſo luxurioufly as theſe, as none venture ſo hardly in the purſuit of a dinner. In Jacobſon's hiſtory of the Feroe Iſlands, we have an account of the method in which thoſe birds are taken; and I will deliver it in his own ſimple manner.

"It cannot be expreſſed with what pains and "danger they take theſe birds in thoſe high "ſteep cliffs, whereof many are two hundred fa-

"thoms high. But there are men apt by nature
"and fit for the work, who take them uſually
"in two manners: they either climb from below
"into theſe high promontories, that are as ſteep
"as a wall; or they let themſelves down with
"a rope from above. When they climb from
"below, they have a pole five or ſix ells long,
"with an iron hook at the end, which they
"that are below in the boat, or on the cliff,
"faſten unto the man's girdle, helping him up
"thus to the higheſt place where he can get
"footing: afterwards they alſo help up another
"man; and thus ſeveral climb up as high as
"poſſibly they can; and where they find diffi-
"culty, they help each other up, by thruſting
"one another up with their poles. When the
"firſt hath taken footing, he draws the other
"up to him, by the rope faſtened to his waſte;
"and ſo they proceed, till they come to the
"place where the birds build. They there go
"about as well as they can, in thoſe dangerous
"places; the one holding the rope at one end,
"and fixing himſelf to the rock; the other
"going at the other end from place to place.
"If it ſhould happen that he chanceth to fall,
"the other that ſtands firm keeps him up, and
"helps him up again. But if he paſſeth ſafe,
"he likewiſe faſtens himſelf till the other has

" paſſed the ſame dangerous place alſo. Thus " they go about the cliffs after birds as they " pleaſe. It often happeneth, however, the " more is the pity, that when one doth not " ſtand faſt enough, or is not ſufficiently ſtrong " to hold up the other in his fall, that they " both fall down and are killed. In this man- " ner ſome do periſh every year."

Mr. Peter Clanſon, in his deſcription of Norway, writeth, that there was antiently a law in that country, that whoſoever climbed ſo on the cliffs, that he fell down and died, if the body was found, before burial, his next kinſman ſhould go the ſame way; but if he durſt not or could not do it, the dead body was not then to be buried in ſanctified earth, as the perſon was too full of temerity, and his own deſtroyer.

" When the fowlers are come, in the man- " ner aforeſaid, to the birds within the cliffs, " where people ſeldom come, the birds are ſo " tame that they take them with their hands; " for they will not readily leave their young. " But when they are wild, they caſt a net, " with which they are provided, over them, " and intangle them therein. In the mean " time, there lieth a boat beneath in the ſea, " wherein they caſt the birds killed; and in " this manner they can, in a ſhort time, fill a

" boat with fowl. When it is pretty fair " weather, and there is good fowling, the " fowlers ſtay in the cliffs ſeven or eight days " together; for there are here and there holes " in the rocks, where they can ſafely reſt; and " they have meat let down to them with a line " from the top of the mountain. In the mean " time ſome go every day to them, to fetch " home what they have taken.

" Some rocks are ſo difficult, that they can " in no manner get unto them from below; " wherefore they ſeek to come down thereunto " from above. For this purpoſe they have a " rope, eighty or a hundred fathoms long, " made of hemp, and three fingers thick. The " fowler maketh the end of this faſt about his " waiſt, and between his legs, ſo that he can " ſit thereon; and is thus let down, with the " fowling ſtaff in his hand. Six men hold by " the rope, and let him eaſily down, laying a " large piece of wood on the brink of the rock, " upon which the rope glideth, that it may not " be worn to pieces by the hard and rough edge " of the ſtone. They have beſides, another " ſmall line, that is faſtened to the fowler's " body; on which he pulleth, to give them " notice how they ſhould let down the great " rope, either lower or higher; or to hold ſtill,

" that he may ſtay in the place whereunto he
" is come. Here the man is in great danger,
" becauſe of the ſtones that are looſened from
" the cliff, by the ſwinging of the rope, and
" he cannot avoid them. To remedy this, in
" ſome meaſure, he hath uſually on his head a
" ſeaman's thick and ſhaggy cap, which defends
" him from the blows of the ſtones, if they be
" not too big; and then it coſteth him his life:
" nevertheleſs, they continually put themſelves
" in that danger, for the wretched body's food-
" ſake, hoping in God's mercy and protection,
" unto which the greateſt part of them do de-
" voutly recommend themſelves when they go
" to work: otherwiſe, they ſay, there is no
" other great danger in it, except that it is a
" toilſome and artificial labour; for he that
" hath not learned to be ſo let down, and is
" not uſed thereto, is turned about with the
" rope, ſo that he ſoon groweth giddy, and
" can do nothing; but he that hath learned the
" art, conſiders it as a ſport, ſwings himſelf
" on the rope, ſets his feet againſt the rock,
" caſts himſelf ſome fathoms from thence, and
" ſhoots himſelf to what place he will: he knows
" where the birds are, he undeſtands how to
" ſit on the line in the air, and how to hold the
" fowling-ſtaff in his hand; ſtriking therewith

" the birds that come or fly away: and when
" there are holes in the rocks, and it ſtretches
" itſelf out, making underneath as a cieling,
" under which the birds are, he knoweth how
" to ſhoot himſelf in among them, and there
" take firm footing. There, when he is in
" theſe holes, he maketh himſelf looſe of the
" rope, which he faſtens to a crag of the rock,
" that it may not ſlip from him to the outſide
" of the cliff. He then goes about in the
" rock, taking the fowl, either with his hands
" or with the fowling-ſtaff. Thus, when he
" hath killed as many birds as he thinks fit, he
" ties them in a bundle, and faſtens them to a
" little rope, giving a ſign, by pulling, that
" they ſhould draw them up. When he has
" wrought thus the whole day, and deſires to
" get up again, he ſitteth once more upon the
" great rope, giving a new ſign, that they
" ſhould pull him up; or elſe he worketh him-
" ſelf up, climbing along the rope, with his
" girdle full of birds. It is alſo uſual, where
" there are not folks enough to hold the great
" rope, for the fowler to drive a poſt ſloping
" into the earth, and to make a rope faſt thereto,
" by which he lets himſelf down, without any
" body's help, to work in the manner afore-

" ſaid. Some rocks are ſo formed that the
" perſon can go into their cavities by land.

" Theſe manners are more terrible and dan-
" gerous to ſee than to deſcribe; eſpecially if
" one conſiders the ſteepneſs and height of the
" rocks, it ſeeming impoſſible for a man to
" approach them, much leſs to climb or de-
" ſcend. In ſome places, the fowlers are ſeen
" climbing where they can only faſten the ends
" of their toes and fingers; not ſhunning ſuch
" places, though there be an hundred fathom
" between them and the ſea. It is a dear meat
" for theſe poor people, for which they muſt
" venture their lives; and many, after long
" venturing, do at laſt periſh therein.

" When the fowl is brought home, a part
" thereof is eaten freſh; another part, when
" there is much taken, being hung up for
" winter proviſion. The feathers are gathered,
" to make merchandize of, for other expences.
" The inhabitants get a great many of theſe
" fowls, as God giveth his bleſſing and fit wea-
" ther. When it is dark and hazy, they take
" moſt; for then the birds ſtay in the rocks;
" but in clear weather, and hot ſun-ſhine, they
" ſeek the ſea. When they prepare to depart
" for the ſeaſon, they keep themſelves moſt
" there, ſitting on the clifts toward the ſea-

"ſide, where people get at them ſometimes "with boats, and take them with fowling-"ſtaves."

Such is the account of this hiſtorian; but we are not to ſuppoſe that all the birds caught in this manner, are of the gull kind: on the contrary, numbers of them are of the penguin kind; auks, puffins and guillemots. Theſe all come, once a ſeaſon, to breed in theſe receſſes; and retire in winter, to fiſh in more ſouthern climates.

CHAP.

## CHAP. VII.

### Of the Penguin Kind: and firſt of the Great Magellanic Penguin.

THE gulls are long winged, ſwift flyers, that hover over the moſt extenſive ſeas, and dart down upon ſuch fiſh as approach too near the ſurface. The penguin kind are but ill fitted for flight, and ſtill leſs for walking. Every body muſt have ſeen the aukward manner in which a duck, either wild or tame, attempts to change place: they muſt recollect with what ſoftneſs and eaſe a gull or a kite waves its pinions, and with what a coil and flutter the duck attempts to move them; how many ſtrokes it is obliged to give, in order to gather a little air; and even when it is thus raiſed, how ſoon it is fatigued with the force of its exertions, and obliged to take reſt again. But the duck is not, in its natural ſtate, half ſo unweildy an animal as the whole tribe of the penguin kind. Their wings are much ſhorter, more ſcantily furniſhed with quills, and the whole pinion placed too forward, to be uſefully employed. For this reaſon, the largeſt of the penguin kind, that have a thick, heavy body to raiſe, cannot

fly at all. Their wings ſerve them rather as paddles to help them forward, when they attempt to move ſwiftly; and in a manner walk along the ſurface of the water. Even the ſmaller kinds ſeldom fly by choice; they flutter their wings with the ſwifteſt efforts without making way; and though they have but a ſmall weight of body to ſuſtain, yet they ſeldom venture to quit the water where they are provided with food and protection.

As the wings of the penguin tribe are unfitted for flight, their legs are ſtill more aukwardly adapted for walking. This whole tribe have all above the knee hid within the belly; and nothing appears but two ſhort legs, or feet, as ſome would call them, that ſeem ſtuck under the rump, and upon which the animal is very aukwardly ſupported. They ſeem, when ſiting or attempting to walk, like a dog that has been taught to ſit up, or to move a minuet. Their ſhort legs drive the body in progreſſion from ſide to ſide; and were they not aſſiſted by their wings, they could ſcarcely move faſter than a tortoiſe.

This aukward poſition of the legs, which ſo unqualifies them for living upon land, adapts them admirably for a reſidence in water. In that, the legs placed behind the moving body,

puſhes it forward with greater velocity; and theſe birds, like Indian canoes, are the ſwifteſt in the water, by having their paddles in the rear. Our ſailors, for this reaſon, give theſe birds the very homely, but expreſſive, name of Arſe-feet.

Nor are they leſs qualified for diving than ſwimming. By ever ſo little inclining their bodies forward, they loſe their center of gravity; and every ſtroke from their feet only tends to ſink them the faſter. In this manner they can either dive at once to the bottom, or ſwim between two waters; where they continue fiſhing for ſome minutes, and then aſcending, catch an inſtantaneous breath, to deſcend once more to renew their operations. Hence it is that theſe birds, which are ſo defenceleſs, and ſo eaſily taken by land, are impregnable by water. If they perceive themſelves purſued in the leaſt, they inſtantly ſink, and ſhew nothing more than their bills, till the enemy is withdrawn. Their very internal conformation aſſiſts their power of keeping long under water. Their lungs are fitted with numerous vacuities, by which they can take in a very large inſpiration; and this probably ſerves them for a length of time.

As they never viſit land, except when they

come to breed, their feathers take a colour from their ſituation. That part of them which has been continually bathed in the water, is white; while their backs and wings are of different colours, according to the different ſpecies. They are alſo covered more warmly all over the body with feathers, than any other birds whatever; ſo that the ſea ſeems entirely their element; and but for the neceſſary duties of propagating the ſpecies, we ſhould ſcarcely have the ſmalleſt opportunity of ſeeing them, and ſhould be utterly unacquainted with their hiſtory.

Of all this tribe, the Magellanic Penguin is the largeſt, and the moſt remarkable. In ſize it approaches near that of a tame gooſe. It never flies, as its wings are very ſhort, and covered with ſtiff hard feathers, and are always ſeen expanded, and hanging uſeleſly down by the bird's ſides. The upper part of the head, back and rump, are covered with ſtiff, black feathers; while the belly and breaſt, as is common with all of this kind, are of a ſnowy whiteneſs, except a line of black that is ſeen to croſs the crop. The bill, which from the baſe to about half way is covered with wrinkles, is black, but marked croſswiſe with a ſtripe of yellow. They walk

erect with their heads on high, their fin-like wings hanging down like arms; ſo that to ſee them at a diſtance, they look like ſo many children with white aprons. From hence they are ſaid to unite in themſelves the qualities of men, fowls and fiſhes. Like men, they are upright; like fowls, they are feathered, and like fiſhes, they have fin-like inſtruments, that beat the water before, and ſerve for all the purpoſes of ſwimming rather than flying.

They feed upon fiſh; and ſeldom come aſhore, except in the breeding-ſeaſon. As the ſeas in that part of the world abound with a variety, they ſeldom want food; and their extreme fatneſs ſeems a proof of the plenty in which they live. They dive with great rapidity, and are voracious to a great degree. One of them, deſcribed by Cluſius, though but very young, would ſwallow an entire herring at a mouthful, and often three ſucceſſively before it was appeaſed. In conſequence of this gluttonous appetite, their fleſh is rank and fiſhy; though our ſailors ſay, that *it is pretty good eating*. In ſome the fleſh is ſo tough, and the feathers ſo thick, that they ſtand the blow of a ſcymitar without injury.

They are a bird of ſociety; and eſpecially when they come on ſhore, they are ſeen drawn up

in rank and file, upon the ledge of a rock, ſtanding together with the albatroſs, as if in conſulation. This is previous to their laying, which generally begins in that part of the world in the month of November. Their preparations for laying are attended with no great trouble, as a ſmall depreſſion in the earth, without any other neſt, ſerves for this purpoſe. The warmth of their feathers and the heat of their bodies is ſuch, that the progreſs of incubation is carried on very rapidly.

But there is a difference in the manner of this bird's neſtling in other countries; which I can only aſcribe to the frequent diſturbances it has received from man or quadrupedes in its receſſes. In ſome places, inſtead of contenting itſelf with a ſuperficial depreſſion in the ground, the penguin is found to burrow two or three yards deep: in other places it is ſeen to forſake the level, and to clamber up the ledge of a rock, where it lays its egg, and hatches it in that bleak, expoſed ſituation. Theſe precautions may probably have been taken, in conſequence of dear-bought experience. In thoſe countries where the bird fears for her own ſafety, or that of her young, ſhe may providentially provide againſt danger, by digging, or even by climbing; for both which ſhe is but ill adapted by nature. In thoſe places,

however, where the penguin has had but few viſits from man, her neſt is made, with the moſt confident ſecurity, in the middle of ſome large plain, where they are ſeen by thouſands. In that unguarded ſituation, neither expecting nor fearing a powerful enemy, they continue to ſit brooding; and even when man comes among them, have at firſt no apprehenſion of their danger. Some of this tribe have been called, by our ſea-men, the Booby, from the total inſenſibility which they ſhew when they are ſought to their deſtruction. But it is not conſidered that theſe birds have never been taught to know the dangers of an human enemy: it is againſt the fox or the vulture that they have learned to defend themſelves; but they have no idea of injury from a being ſo very unlike their natural oppoſers. The penguins, therefore, when our ſea-men firſt came among them, tamely ſuffered themſelves to be knocked on the head, without even attempting an eſcape. They have ſtood to be ſhot at in flocks, without offering to move, in ſilent wonder, till every one of their number has been deſtroyed. Their attachment to their neſts was ſtill more powerful; for the females tamely ſuffered the men to approach and take their eggs, without any reſiſtance. But the expe-perience of a few of thoſe unfriendly viſits, has

long ſince taught them to be more upon their guard in chuſing their ſituations; or to leave thoſe retreats where they were ſo little able to oppoſe their invaders.

The penguin lays but one egg; and, in frequented ſhores, is found to burrow like a rabbit: ſometimes three or four take poſſeſſion of one hole, and hatch their young together. In the holes of the rocks, where Nature has made them a retreat, ſeveral of this tribe, as Linnæus aſſures us, are ſeen together. There the females lay their ſingle egg in a common neſt, and ſit upon this their general poſſeſſion by turns; while one is placed as a centinel, to give warning of approaching danger. The egg of the penguin, as well as of all this tribe, is very large for the ſize of the bird, being generally found bigger than that of a gooſe. But as there are many varieties of the penguin, and as they differ in ſize, from that of a Muſcovy duck to a ſwan, the eggs differ in the ſame proportion.

## CHAP. VIII.

### Of the Auk, Puffin, and other Birds of the Penguin Kind.

OF a ſize far inferior to the penguin, but with nearly the ſame form, and exactly of the ſame appetites and manners, there is a very numerous tribe. Theſe frequent our ſhores, and, like the penguin, have their legs placed behind. They have ſhort wings, which are not totally incapable of flight; with round bills for ſeizing their prey, which is fiſh. They live upon the water, in which they are continually ſeen diving; and ſeldom venture upon land, except for the purpoſes of continuing their kind.

The firſt of this ſmaller tribe is the Great Northern Diver, which is nearly of the ſize of a gooſe: it is beautifully variegated all over with many ſtripes, and differs from the penguin, in being much ſlenderer and more elegantly formed. The Grey Speckled Diver does not exceed the ſize of a Muſcovy duck; and, except in ſize, greatly reſembles the former. The Auk, which breeds on the iſlands of St. Kilda, and chiefly differs from the penguin

in ſize and colour. It is ſmaller than a duck; and the whole of the breaſt and belly, as far as the middle of the throat, is white. The Guillemot is about the ſame ſize; it differs from the auk, in having a longer, a ſlenderer, and a ſtraighter bill. The Scarlet Throated Diver may be diſtinguiſhed by its name; and the Puffin or Coulterneb, is one of the moſt remarkable birds we know.

Words cannot eaſily deſcribe the form of the bill of the puffin, which differs ſo greatly from that of any other bird. Thoſe who have ſeen the coulter of a plough, may form ſome idea of the beak of this odd-looking animal. The bill is flat; but, very different from that of the duck, its edge is upwards. It is of a triangular figure, and ending in a ſharp point; the upper chap bent a little downward, where it is joined to the head: and a certain callous ſubſtance encompaſſing its baſe, as in parrots. It is of two colours; aſh-coloured near the baſe, and red towards the point. It has three furrows or groves impreſſed in it; one in the livid part, two in the red. The eyes are fenced with a protuberant ſkin, of a livid-colour; and they are grey or aſh-coloured. Theſe are marks ſufficient to diſtingniſh this bird by; but its

value to thoſe in whoſe vicinity it breeds, renders it ſtill more an object of curioſity.

The puffin, like all the reſt of this kind, has its legs thrown ſo far back, that it can hardly move without tumbling. This makes it riſe with difficulty, and ſubject to many falls before it gets upon the wing; but as it is a ſmall bird, not much bigger than a pigeon, when it once riſes, it can continue its flight with great celerity.

Both this and all the former build no neſt; but lay their eggs either in the crevices of rocks, or in holes under ground near the ſhore. They chiefly chuſe the latter ſituation; for the puffin, the auk, the guillemot, and the reſt, cannot eaſily riſe to the neſt when in a lofty ſituation. Many are the attempts theſe birds are ſeen to make to fly up to thoſe neſts which are ſo high above the ſurface. In rendering them inacceſſible to mankind, they often render them almoſt inacceſſible to themſelves. They are frequently obliged to make three or four efforts, before they can come at the place of incubation. For this reaſon, the auk and guillemot, when they have once laid their ſingle egg, which is extremely large for the ſize, ſeldom forſake it until it is excluded. The male, who is better furniſhed for flight,

feeds the female during this interval; and ſo bare is the place where ſhe ſits, that the egg would often roll down from the rock, did not the body of the bird ſupport it.

But the puffin ſeldom chuſes theſe inacceſſible and troubleſome heights for its ſituation. Relying on its courage, and the ſtrength of its bill, with which it bites moſt terribly, it either makes or finds a hole in the ground, where to lay and bring forth its young. All the winter theſe birds, like the reſt, are abſent; viſiting regions too remote for diſcovery. At the latter end of March, or the beginning of April, come over a troop of their ſpies or harbingers, that ſtay two or three days, as it were to view and ſearch out for their former ſituations, and ſee whether all be well. This done, they once more depart; and, about the beginning of May, return again with the whole army of their companions. But if the ſeaſon happens to be ſtormy and tempeſtuous, and the ſea troubled, the unfortunate voyagers undergo incredible hardſhips; and they are found, by hundreds, caſt away upon the ſhores, lean and periſhed with famine*. It is moſt probable, therefore, that this voyage is performed more on the water than in the air; and as they cannot fiſh

* Willoughby's Ornith. p. 326.

in ſtormy weather, their ſtrength is exhauſted before they can arrive at their wiſhed-for harbour.

The puffin, when it prepares for breeding, which always happens a few days after its arrival, begins to ſcrape up an hole in the ground not far from the ſhore, and when it has ſome way penetrated the earth, it then throws itſelf upon its back, and with bill and claws thus burrows inward, till it has dug a hole with ſeveral windings and turnings, from eight to ten feet deep. It particularly ſeeks to dig under a ſtone, where it expects the greateſt ſecurity. In this fortified retreat it lays one egg; which, though the bird be not much bigger than a pigeon, is of the ſize of a hen.

When the young one's excluded, the parent's induſtry and courage is incredible. Few birds or beaſts will venture to attack them in their retreats. When the great ſea-raven, as Jacobſon informs us, comes to take away their young, the puffins boldly oppoſe him. Their meeting affords a moſt ſingular combat. As ſoon as the raven approaches, the puffin catches him under the throat with its beak, and ſticks its claws into his breaſt, which makes the raven, with a loud ſcreaming, attempt to get away; but the little bird ſtill holds faſt to the invader,

nor lets him go till they both come to the ſea, where they drop down together, and the raven is drowned: yet the raven is but too often ſucceſsful; and invading the puffin at the bottom of its hole, devours both the parent and its family.

But were a puniſhment to be inflicted for immorality in irrational animals, the puffin is juſtly a ſufferer from invaſion, as it is often itſelf one of the moſt terrible invaders. Near the Iſle of Angleſey, in an iſlet called Prieſholm, their flocks may be compared, for multitude, to ſwarms of bees. In another iſlet, called the Calf of Man, a bird of this kind, but of a different ſpecies, is ſeen in great abundance. In both places, numbers of rabbits are found to breed; but the puffin, unwilling to be at the trouble of making a hole, when there is one ready made, diſpoſſeſſes the rabbits, and it is not unlikely deſtroys their young. It is in theſe unjuſtly acquired retreats that the young puffins are found in great numbers, and become a very valuable acquiſition to the natives of the place. The old ones (I am now ſpeaking of the Manks puffin) early in the morning, at break of day, leave their neſts and young, and even the iſland, nor do they return till night-fall. All this time they are diligently

employed in fiſhing for their young; ſo that their retreats on land, which in the morning were loud and clamorous, are now ſtill and quiet, with not a wing ſtirring till the approach of duſk, when their ſcreams once more announce their return. Whatever fiſh, or other food, they have procured in the day, by night begins to ſuffer a kind of half digeſtion, and is reduced to an oily matter, which is ejected from the ſtomach of the old ones into the mouth of the young. By this they are nouriſhed, and become fat to an amazing degree. When they are arrived to their full growth, they who are intruſted by the lord of the iſland, draw them from their holes; and, that they may more readily keep an account of the number they take, cut off one foot as a token. Their fleſh is ſaid to be exceſſively rank, as they feed upon fiſh, eſpecially ſprats and ſea-weed; however, when they are pickled and preſerved with ſpices, they are admired by thoſe who are fond of high eating. We are told, that formerly their fleſh was allowed by the church on Lenten days. They were, at that time, alſo taken by ferrets, as we do rabbits. At preſent, they are either dug out, or drawn out, from their burrows, with an hooked ſtick. They bite extremely hard, and keep ſuch faſt hold of whatſoever

they ſeize upon, as not to be eaſily diſengaged. Their noiſe when taken is very diſagreeable, being like the efforts of a dumb perſon attempting to ſpeak.

The conſtant depredation, which theſe birds annually ſuffer, does not in the leaſt ſeem to intimidate them, or drive them away: on the contrary, as the people ſay, the neſt muſt be robbed, or the old ones will breed there no longer. All birds of this kind lay but one egg; yet if that be taken away, they will lay another, and ſo on to a third; which ſeems to imply that robbing their neſts does not much intimidate them from laying again. Thoſe, however, whoſe neſts have been thus deſtroyed, are often too late in bringing up their young; who, if they be not fledged and prepared for migration when all the reſt depart, are left at land to ſhift for themſelves. In Auguſt the whole tribe is ſeen to take leave of their ſummer reſidence; nor are they obſerved any more till the return of the enſuing ſpring. It is probable that they ſail away to more ſouthern regions, as our mariners frequently ſee myriads of water-fowl upon their return, and ſteering uſually to the north. Indeed, the coldeſt countries ſeem to be their moſt favoured retreats; and the number of water-fowl is much greater in thoſe

colder climates, than in the warmer regions, near the line. The quantity of oil which abounds in their bodies, ſerves as a defence againſt cold, and preſerves them in vigour againſt its ſeverity; but the ſame proviſion of oil is rather detrimental in warm countries, as it turns rancid, and many of them die of diſorders which ariſe from its putrefaction. In general, however, water-fowl can be properly ſaid to be of no climate; the element upon which they live, being their proper reſidence. They neceſſarily ſpend a few months of ſummer upon land, to bring up their young: but the reſt of their time is probably conſumed in their migrations, or near ſome unknown coaſts, where their proviſion of fiſh is found in greateſt abundance.

Before I go to the third general diviſion of water-fowls, it may not be improper to obſerve, that there is one ſpecies of round billed water-fowl, that does not properly lie within any of the former diſtributions. This is the Gooſe-ander; a bird with the body and wing ſhaped like thoſe of the penguin kind, but with legs not hid in the belly. It may be diſtinguiſhed from all others by its bill, which is round, hooked at the point, and toothed, both upper and under chap, like a ſaw. Its colours are

various and beautiful: however, its manners and appetites entirely reſemble thoſe of the Diver. It feeds upon fiſh, for which it dives; and is ſaid to build its neſt upon trees, like the heron and the cormorant. It ſeems to form the ſhade between the penguin and the gooſe kind; having a round bill, like the one; and unembarraſſed legs, like the other. In the ſhape of the head, neck and body, it reſembles them both.

CHAP.

## CHAP. IX.

### Of Birds of the Gooſe Kind, properly ſo called.

THE Swan, the Gooſe, and the Duck, are leaders of a numerous, uſeful, and beautiful tribe of birds, that we have reclaimed from a ſtate of nature, and have taught to live in dependance about us. To deſcribe any of theſe would be as ſuperfluous as definitions uſually are when given of things with which we are already well acquainted. There are few that have not had opportunities of ſeeing them, and whoſe ideas would not anticipate our deſcription. But, though nothing be ſo eaſy as to diſtinguiſh theſe in general from each other, yet the largeſt of the duck-kind approach the gooſe ſo nearly, that it may be proper to mark the diſtinctions.

The marks of the gooſe are, a bigger body, large wings, a longer neck, a white ring about the rump, a bill thicker at the baſe, ſlenderer towards the tip, with ſhorter legs, placed more forward on the body. They both have a wadling walk; but the duck, from the poſition of its legs, has it in a greater degree. By theſe marks, theſe ſimilar tribes may be known

aſunder; and though the duck ſhould be found to equal the gooſe in ſize, which ſometimes happens, yet there are ſtill other ſufficient diſtinctions.

But they all agree in many particulars; and have a nearer affinity to each other than the neighbouring kinds in any other department. Their having been tamed has produced alterations in each, by which they differ as much from the wild ones of their reſpective kinds as they do among themſelves. There is nearly as much difference between the wild and the tame duck, as between ſome ſorts of the duck and the gooſe; but ſtill, the characteriſtics of the kind are ſtrongly marked and obvious; and this tribe can never be miſtaken.

The bill is the firſt great obvious diſtinction of the gooſe-kind from all of the feathered tribe. In other birds it is round and wedge-like, or crooked at the end. In all the gooſe kind it is flat and broad, made for the purpoſes of ſkimming ponds and lakes of the mantling weeds that ſtand on the ſurface. The bills of other birds are made of an horny ſubſtance throughout; theſe have their inoffenſive bills ſheathed with a ſkin which covers them all over. The bill of every other bird ſeems in ſome meaſure formed for piercing or tearing; theirs are only

fitted for ſhoveling up their food, which is chiefly of the vegetable kind.

Though theſe birds do not reject animal food when offered them, yet they can contentedly ſubſiſt upon vegetables, and ſeldom ſeek any other. They are eaſily provided for; wherever there is water, there ſeems to be plenty. All the other web-footed tribes are continually voracious, continually preying. Theſe lead more harmleſs lives: the weeds on the ſurface of the water, or the inſects at the bottom, the graſs by the bank, or the fruits and corn in cultivated grounds, are ſufficient to ſatisfy their eaſy appetites: yet theſe, like every other animal, will not reject fleſh, if properly prepared for them; it is ſufficient praiſe to them that they do not eagerly purſue it.

As their food is chiefly vegetables, ſo their fecundity is in proportion. We have had frequent opportunities to obſerve, that all the predatory tribes, whether of birds or quadrupedes, are barren and unfruitful. We have ſeen the lion with its two cubs; the eagle with the ſame number; and the penguin with even but one. Nature that has ſupplied them with powers of deſtruction, has denied them fertility. But it is otherwiſe with theſe harmleſs animals I am deſcribing. They ſeem formed to fill up the chaſms in animated nature, cauſed by the vo-

raciouſneſs of others. They breed in great abundance, and lead their young to the pool the inſtant they are excluded.

As their food is ſimple, ſo their fleſh is nouriſhing and wholeſome. The ſwan was conſidered as a high delicacy among the ancients; the gooſe was abſtained from as totally indigeſtible. Modern manners have inverted taſtes; the gooſe is now become the favourite; and the ſwan is ſeldom brought to table unleſs for the purpoſes of oſtentation. But at all times the fleſh of the duck was in high eſteem; the ancients thought even more highly of it than we do. We are contented to eat it as a delicacy; they alſo conſidered it as a medicine; and Plutarch aſſures us, that Cato kept his whole family in health, by feeding them with duck whenever they threatened to be out of order.

Theſe qualities of great fecundity, eaſy ſuſtenance, and wholeſome nouriſhment, have been found ſo conſiderable as to induce man to take theſe birds from a ſtate of nature and render them domeſtic. How long they have been thus dependants upon his pleaſures is not known; for from the earlieſt accounts, they were conſidered as familiars about him. The time muſt have been very remote; for there have been many changes wrought in

their colours, their figures, and even their internal parts, by human cultivation. The different kinds of theſe birds, in a wild ſtate, are ſimple in their colourings: when one has ſeen a wild gooſe or a wild duck, a deſcription of its plumage will, to a feather, exactly correſpond with that of any other. But in the tame kinds no two of any ſpecies are exactly alike. Different in their ſize, their colours, and frequently in their general form. They ſeem the mere creatures of art; and, having been ſo long dependant upon man for ſupport, they ſeem to aſſume forms entirely ſuited to his pleaſures or neceſſities.

CHAP.

## CHAP. X.

### Of the Swan, tame and wild.

NO bird makes a more indifferent figure upon land, or a more beautiful one in the water, than the Swan. When it aſcends from its favourite element, its motions are aukward, and its neck is ſtretched forward with an air of ſtupidity; but when it is ſeen ſmoothly ſailing along the water, commanding a thouſand graceful attitudes, moving at pleaſure without the ſmalleſt effort, when it "proudly rows its "ſtate," as Milton has it, "with arched neck, "between its white wings mantling," there is not a more beautiful figure in all nature. In the exhibition of its form, there are no broken or harſh lines; no conſtrained or catching motions; but the roundeſt contours, and the eaſieſt tranſitions; the eye wanders over every part with inſatiable pleaſure, and every part takes a new grace with new motion.

This fine bird has long been rendered domeſtic; and it is now a doubt whether there be any of the tame kind in a ſtate of nature. The wild ſwan, though ſo ſtrongly reſembling this in colour and form, is yet a different bird; for it

is very differently formed within. The wild ſwan is leſs than the tame by almoſt a fourth; for as the one weighs twenty pounds, the other only weighs ſixteen pounds and three quarters. The colour of the tame ſwan is all over white; that of the wild bird is, along the back and the tips of the wings, of an aſh-colour. But theſe are ſlight differences, compared to what are found upon diſſection. In the tame ſwan, the wind pipe ſinks down into the lungs in the ordinary manner; but in the wild, after a ſtrange and wonderful contortion, like what we have ſeen in the crane, it enters through a hole formed in the breaſt-bone; and being reflected therein, returns by the ſame aperture; and being contracted into a narrow compaſs by a broad and bony cartilage, it is divided into two branches, which, before they enter the lungs, are dilated and as it were ſwolen out into two cavities.

Such is the extraordinary difference between theſe two animals, which externally ſeem to be of one ſpecies. Whether it is in the power of long continued captivity and domeſtication to produce this ſtrange variety, between birds otherwiſe the ſame, I will not take upon me to determine. But certain it is, that our tame ſwan is no where to be found, at leaſt in Europe, in a ſtate of nature.

As it is not eaſy to account for this difference of conformation, ſo it is ſtill more difficult to reconcile the accounts of the ancients with the experience of the moderns, concerning the vocal powers of this bird. The tame ſwan is one of the moſt ſilent of all birds; and the wild one has a note extremely loud and diſagreeable. It is probable, the convolutions of the wind-pipe may contribute to encreaſe the clangor of it; for ſuch is the harſhneſs of its voice, that the bird from thence has been called the Hooper. In neither is there the ſmalleſt degree of melody; nor have they, for above this century, been ſaid to give ſpecimens of the ſmalleſt muſical abilities: yet, notwithſtanding this, it was the general opinion of antiquity, that the ſwan was a moſt melodious bird; and that, even to its death, its voice went on improving. It would ſhew no learning to produce what they have ſaid upon the muſic of the ſwan: it has already been collected by Aldrovandus; and ſtill more profeſſedly by the Abbe Gedoyn, in the Tranſactions of the Academy of Belles Lettres. From theſe accounts it appears that, while Plato, Ariſtotle, and Diodorus Siculus, believed the vocality of the ſwan, Pliny and Virgil ſeem to doubt that received opinion. In this equipoiſe of authority, Aldrovandus ſeems to have deter-

mined in favour of the Greek philoſophers; and the form of the wind pipe in the wild ſwan, ſo much reſembling a muſical inſtrument, inclined his belief ſtill more ſtrongly. In aid of this alſo, came the teſtimony of Pendaſius, who affirmed, that he had often heard ſwans ſweetly ſinging in the lake of Mantua, as he was rowed up and down in a boat; as alſo of Olaus Wormius, who profeſſed that many of his friends and ſcholars had heard them ſinging. "There was," ſays he, "in my family, a very "honeſt young man, John Roſtorph, a ſtu-"dent in divinity, and a Norwegian by nation. "This man did, upon his credit, and with the "interpoſition of an oath, ſolemnly affirm that "once, in the territory of Dronten, as he was "ſtanding on the ſea ſhore, early in the morn-"ing, he heard an unuſual and ſweet murmur, "compoſed of moſt pleaſant whiſtlings and "ſounds; he knew not at firſt whence they came, "or how they were made, for he ſaw no man near "to produce them; but looking round about "him, and climbing to the top of a certain pro-"montory, he there eſpied an infinite number "of ſwans gathered together in a bay, and "making the moſt delightful harmony: a "ſweeter in all his life-time he had never "heard." Theſe were accounts ſufficient at leaſt to keep opinion in ſuſpenſe, though in con-

tradiction to our own experience; but Aldrovandus, to put, as he ſuppoſed, the queſtion paſt all doubt, gives us the teſtimony of a countryman of our own, from whom he had the relation. This honeſt man's name was Mr. George Braun, who aſſured him, that nothing was more common in England, than to hear ſwans ſing; that they were bred in great numbers in the ſea, near London; and that every fleet of ſhips that returned from their voyages from diſtant countries, were met by ſwans, that came joyfully out to welcome their return, and ſalute them with a loud and chearful ſinging! It was in this manner that Aldrovandus, that great and good man, was frequently impoſed upon by the deſigning and the needy: his unbounded curioſity drew round him people of every kind, and his generoſity was as ready to reward falſehood as truth —Poor Aldrovandus! after having ſpent a vaſt fortune, for the purpoſes of enlightening mankind; after having collected more truth and more falſeſhood than any man ever did before him, he little thought of being reduced at laſt to want bread, to feel the ingratitude of his country, and to die a beggar in a public hoſpital!

Thus it appears that our modern authorities, in favour of the ſinging of ſwans, are rather

ſuſpicious, ſince they are reduced to this Mr. George Braun, and John Roſtorph, the native of a country remarkable for ignorance and credulity. It is probable the ancients had ſome mythological meaning in aſcribing melody to the ſwan; and as for the moderns, they ſcarce deſerve our regard. The ſwan, therefore, muſt be content with that ſhare of fame which it poſſeſſes on the ſcore of its beauty; ſince the melody of its voice, without better teſtimony, will ſcarcely be admitted by even the credulous.

This beautiful bird is as delicate in its appetites, as elegant in its form. Its chief food is corn, bread, herbs growing in the water, and roots and ſeeds, which are found near the margin. It prepares a neſt in ſome retired part of the bank, and chiefly where there is an iſlet in the ſtream. This is compoſed of water-plants, long graſs and ſticks; and the male and female aſſiſt in forming it with great aſſiduity. The ſwan lays ſeven or eight eggs, white, much larger than thoſe of a gooſe, with a hard, and ſometimes a tuberous ſhell. It ſits near two months before its young are excluded; which are aſh-coloured when they firſt leave the ſhell, and for ſome months after. It is not a little dangerous to approach the old ones, when their little family are feeding round them. Their

fears, as well as their pride, ſeems to take the alarm; and they have ſometimes been known to give a blow with their pinion, that has broke a man's leg or arm.

It is not till they are a twelve-month old that the young ſwans change their colour with their plumage. All the ſtages of this bird's approach to maturity are ſlow, and ſeem to mark its longevity. It is two months hatching; a year in growing to its proper ſize; and if, according to Pliny's obſervation, that thoſe animals that are longeſt in the womb are the longeſt lived, the ſwan is the longeſt in the ſhell of any bird we know, and is ſaid to be remarkable for its longevity. Some ſay that it lives three hundred years; and Willoughby, who is in general diffident enough, ſeems to believe the report. A gooſe, as he juſtly obſerves, has been known to live an hundred; and the ſwan, from its ſuperior ſize, and from its harder, firmer fleſh, may naturally be ſuppoſed to live ſtill longer.

Swans were formerly held in ſuch great eſteem in England, that, by an act of Edward the Fourth, none, except the ſon of the king, was permitted to keep a ſwan, unleſs poſſeſſed of five marks a year. By a ſubſequent act, the puniſhment for taking their eggs was impriſon-

ment for a year and a day, and a fine at the king's will. At preſent they are but little valued for the delicacy of their fleſh; but many are ſtill preſerved for their beauty. We ſee multitudes on the Thames and Trent; but no where greater numbers than on the ſalt water inlet of the ſea near Abbotſberry, in Dorſetſhire.

CHAP.

## CHAP. XI.

### Of the Gooſe and its Varieties.

THE Gooſe, in its domeſtic ſtate, exhibits a variety of colours. The wild gooſe always retains the ſame marks: the whole upper part is aſh-coloured; the breaſt and belly are of a dirty white; the bill is narrow at the baſe, and at the tip it is black; the legs are of a ſaffron colour, and the claws black. Theſe marks are ſeldom found in the tame; whoſe bill is entirely red, and whoſe legs are entirely brown. The wild gooſe is rather leſs than the tame; but both invariably retain a white ring round their tail, which ſhews that they are both deſcended from the ſame original.

The wild gooſe is ſuppoſed to breed in the northern parts of Europe; and, in the beginning of winter, to deſcend into more temperate regions. They are often ſeen flying at very great heights, in flocks from fifty to an hundred, and ſeldom reſting by day. Their cry is frequently heard when they are at an imperceptible diſtance above us; and this ſeems bandied from one to the other, as among hounds in the purſuit. Whether this be the

note of mutual encouragement, or the neceſſary conſequence of reſpiration, is doubtful; but they ſeldom exert it when they alight in theſe journies.

Upon their coming to the ground by day, they range themſelves in a line, like cranes; and ſeem rather to have deſcended for reſt, than for other refreſhment. When they have ſat in this manner for an hour or two, I have heard one of them, with a loud long note, ſound a kind of charge, to which the reſt punctually attended, and they purſued their journey with renewed alacrity. Their flight is very regularly arranged: they either go in a line a-breaſt, or in two lines, joining in an angle in the middle. I doubt whether the form of their flight be thus arranged to cut the air with greater eaſe, as is commonly believed; I am more apt to think it is to preſent a ſmaller mark to fowlers from below. A bullet might eaſily reach them, if huddled together in a flock, and the ſame diſcharge might deſtroy ſeveral at once; but, by their manner of flying, no ſhot from below can affect above one of them; and from the height at which they fly, this is not eaſy to be hit.

The Barnacle differs in ſome reſpects from both theſe; being leſs than either, with a

black bill, much ſhorter than either of the preceding. It is ſcarce neceſſary to combat the idle error of this bird's being bred from a ſhell ſticking to ſhip's bottoms; it is well known to be hatched from an egg, in the ordinary manner, and to differ in very few particulars from all the reſt of its kind.

The Brent Gooſe is ſtill leſs than the former, and not bigger than a Muſcovy duck, except that the body is longer. The head, neck, and upper part of the breaſt, are black; but about the middle of the neck, on each ſide, are two ſmall ſpots or lines of white, which together appear like a ring.

Theſe, and many other varieties, are found in this kind; which agree in one common character of feeding upon vegetables, and being remarkable for their fecundity. Of theſe, however, the tame gooſe is the moſt fruitful. Having leſs to fear from its enemies, leading a ſecurer and a more plentiful life, its prolific powers encreaſe in proportion to its eaſe; and though the wild gooſe ſeldom lays above eight eggs, the tame gooſe is often ſeen to lay above twenty. The female hatches her eggs with great aſſiduity; while the Gander viſits her twice or thrice a day, and ſometimes drives her off to take her place, where he ſits with great ſtate and compoſure.

But beyond that of all animals is his pride when the young are excluded: he ſeems then to conſider himſelf as a champion not only obliged to defend his young, but alſo to keep off the ſuſpicion of danger; he purſues dogs and men that never attempt to moleſt him; and, though the moſt harmleſs thing alive, is then the moſt petulant and provoking. When, in this manner, he has purſued the calf or the maſtiff, to whoſe contempt alone he is indebted for ſafety, he returns to his female and her brood in triumph, clapping his wings, ſcreaming, and ſhewing all the marks of conſcious ſuperiority. It is probable, however, theſe arts ſucceed in raiſing his importance among the tribe where they are diſplayed; and it is probable there is not a more reſpectable animal on earth to a gooſe than a gander!

A young gooſe is generally reckoned very good eating; yet the feathers of this bird ſtill farther encreaſe its value. I feel my obligations to this animal every word I write; for, however deficient a man's head may be, his pen is nimble enough upon every occaſion: it is happy indeed for us, that it requires no great effort to put it in motion. But the feathers of this bird are ſtill as valuable in another capacity, as they make the ſofteſt and the warmeſt beds to ſleep on.

Of goose-feathers moſt of our beds in Europe are compoſed; in the countries bordering on the Levant, and in all Aſia, the uſe of them is utterly unknown. They there uſe matraſſes, ſtuffed with wool, or camel's hair or cotton; and the warmth of their climate may perhaps make them diſpenſe with cuſhions of a ſofter kind. But how it happens that the ancients had not the uſe of feather-beds, is to me ſurprizing: Pliny tell us, indeed, that they made bolſters of feathers to lay their heads on; and this ſerves as a proof that they turned feathers to no other uſes.

As feathers are a very valuable commodity, great numbers of geeſe are kept tame in the fens in Lincolnſhire, which are plucked once or twice a year. Theſe make a conſiderable article of commerce. The feathers of Somerſetſhire are moſt in eſteem; thoſe of Ireland are reckoned the worſt. Hudſon's Bay alſo furniſhes very fine feathers, ſuppoſed to be of the gooſe kind. The down of the ſwan is brought from Dantzic. The ſame place alſo ſends us great quantities of the feathers of the cock and hen; but Greenland, Iceland, and Norway, furniſh the beſt feathers of all: and in this number we may reckon the Eider-down, of which we ſhall take notice in its place. The

beſt method of curing feathers, is to lay them in a room in an open expoſure to the ſun, and, when dried, to put them into bags, and beat them well with poles to get the duſt off. But, after all, nothing will prevent, for a time, the heavy ſmell which ariſes from the putrefaction of the oil contained in every feather; no expoſure will draw this off, how long ſoever it be continued; they muſt be lain upon, which is the only remedy: and, for this reaſon, old feathers are much more valuable than new.

CHAP.

## CHAP. XII.

### Of the Duck and its Varieties.

THE Tame Duck is the moſt eaſily reared of all our domeſtic animals. The very inſtincts of the young ones direct them to their favourite element; and though they are conducted by a hen, yet they deſpiſe the admonitions of their leader.

This ſerves as an inconteſtible proof that all birds have their manners rather from nature than education. A falcon purſues the partridge, not becauſe it is taught by the old one, but becauſe its appetites make their importunate call for animal food; the cuckoo follows a very different trade from that which its nurſe endeavoured to teach it; and, if we may credit Pliny, in time deſtroys its inſtructor: animals of the duck kind alſo follow their appetites, not their tutor, and come to all their various perfections without any guide. All the arts poſſeſſed by man, are the reſult of accumulated experience; all the arts of inferior animals are ſelf-taught, and ſcarce one acquired by imitation.

It is uſual with the good women to lay duck-eggs under a hen, becauſe ſhe hatches them

better than the original parent would have done. The duck ſeems to be an heedleſs, inattentive mother; ſhe frequently leaves her eggs till they ſpoil, and even ſeems to forget that ſhe is entruſted with the charge: ſhe is equally regardleſs of them when excluded; ſhe leads them to the pond, and thinks ſhe has ſufficiently provided for her offspring when ſhe has ſhewn them the water. Whatever advantages may be procured by coming near the houſe, or attending in the yard, ſhe declines them all; and often lets the vermin, who haunt the waters, deſtroy them, rather than bring them to take ſhelter nearer home. The hen is a nurſe of a very oppoſite character; ſhe broods with the utmoſt aſſiduity, and generally brings forth a young one from every egg committed to her charge; ſhe does not lead her younglings to the water indeed, but ſhe watchfully guards them when there by ſtanding at the brink. Should the rat, or the weazle, attempt to ſeize them, the hen can give them protection; ſhe leads them to the houſe when tired with padling, and rears up the ſuppoſitious brood, without ever ſuſpecting that they belong to another.

The wild duck differs, in many reſpects, from the tame; and in them there is ſtill greater

variety than among the domeſtic kinds. Of the tame duck there are not leſs than ten different ſorts; and of the wild, Briſſon reckons above twenty. The moſt obvious diſtinction between wild and tame ducks is in the colour of their feet; thoſe of the tame duck being black; thoſe of the wild duck yellow. The difference between wild ducks among each other, ariſes as well from their ſize as the nature of the place they feed in. Sea-ducks, which feed in the ſalt-water, and dive much, have a broad bill, bending upwards, a large hind toe, and a long blunt tail. Pond-ducks, which feed in plaſhes, have a ſtraight and narrow bill, a ſmall hind toe, and a ſharp pointed train. The former are called, by our decoy-men, foreign ducks; the latter are ſuppoſed to be natives of England. It would be tedious to enter into the minute varieties of ſuch a number of birds; all agreeing in the ſame general figure, the ſame habits and mode of living, and differing in little more than their ſize and the colours of their plumage. In this tribe, we may rank, as natives of our own European dominions, the Eider Duck, which is double the ſize of a common duck, with a black bill; the Velvet Duck, not ſo large, and with a yellow bill; the Scoter, with a knob at the baſe of a yellow bill; the Tufted Duck,

adorned with a thick creſt; the Scaup Duck, leſs than the common duck, with the bill of a greyiſh blue colour; the Golden Eye, with a large white ſpot at the corners of the mouth, reſembling an eye; the Sheldrake, with the bill of a bright red, and ſwelling into a knob; the Mallard, which is the ſtock from whence our tame breed has probably been produced; the Pintail, with the two middle feathers of the tail three inches longer than the reſt; the Pochard, with the head and neck of a bright bay; the Widgeon, with a lead-coloured bill, and the plumage of the back marked with narrow black and white undulated lines, but beſt known by its whiſtling ſound: laſtly, the Teal, which is the ſmalleſt of this kind, with the bill black, the head and upper part of the neck of a bright bay. Theſe are the moſt common birds of the duck kind among ourſelves; but who can deſcribe the amazing variety of this tribe, if he extends his view to the different quarters of the world? The moſt noted of the foreign tribe are, the Muſcovy duck, or, more properly ſpeaking, the Muſk Duck, ſo called from a ſuppoſed muſky ſmell, with naked ſkin round the eyes, and which is a native of Africa. The Braſilian Duck, that is of the ſize of a gooſe, all over black except the tips of the wings. The American Wood Duck, with a variety of

beautiful colours, and a plume of feathers that falls from the back of the head like a friar's cowl. Theſe, and twenty others, might be added, were encreaſing the number of names the way to enlarge the ſphere of our comprehenſion.

All theſe live in the manner of our domeſtic ducks, keeping together in flocks in the winter, and flying in pairs in ſummer, bringing up their young by the water-ſide, and leading them to their food as ſoon as out of the ſhell. Their neſts are uſually built among heath or ruſhes, not far from the water; and they lay twelve, fourteen, or more eggs before they ſit: yet this is not always their method; the dangers they continually encounter from their ground ſituation, ſometimes obliges them to change their manner of building; and their aukward neſts are often ſeen exalted on the tops of trees. This muſt be a very great labour to perform, as the duck's bill is but ill-formed for building a neſt, and giving the materials of which it is compoſed a ſufficient ſtability to ſtand the weather. The neſt, whether high or low, is generally compoſed of ſingular materials. The longeſt graſs, mixed with heath, and lined within with the bird's own feathers, uſually go to the compoſition: however, in proportion as the climate

is colder, the neſt is more artificially made, and more warmly lined. In the Artic regions, nothing can exceed the great care all of this kind take to protect their eggs from the intenſeneſs of the weather. While the gull and the penguin kind ſeem to diſregard the ſevereſt cold, the duck, in thoſe regions, forms itſelf a hole to lay in, ſhelters the approach, lines it with a layer of long graſs and clay, within that another of moſs, and laſtly, a warm coat of feathers or down. The eider duck is particularly remarkable for the warmth of its neſt. This bird, which, as was ſaid, is above twice as large as the common duck, and reſides in the colder climates, lays from ſix to eight eggs, making her neſt among the rocks or the plants along the ſea-ſhore. The external materials of the neſt are ſuch as are in common with the reſt of the kind; but the inſide lining, on which the eggs are immediately depoſited, is at once the ſofteſt, warmeſt, and the lighteſt ſubſtance with which we are acquainted. This is no other than the inſide down which covers the breaſt of the bird in the breeding-ſeaſon. This the female plucks off with her bill, and furniſhes the inſide of her neſt with a tapeſtry more valuable than the moſt ſkilful artiſts can produce. The natives watch the place where ſhe begins to

build, and, ſuffering her to lay, take away both the eggs and the neſt. The duck, however, not diſcouraged by the firſt diſappointment, builds and lays in the ſame place a ſecond time; and this they in the ſame manner take away: the third time ſhe builds, but the drake muſt ſupply the down from his breaſt to line the neſt with: and, if this be robbed, they both forſake the place, and breed there no more. This down the natives take care to ſeparate from the dirt and moſs with which it is mixed; and, though no people ſtand in more need of a warm covering than themſelves, yet their neceſſities compel them to ſell it to the more indolent and luxurious inhabitants of the ſouth for brandy and tobacco.

As they poſſeſs the faculties of flying and ſwimming, ſo they are in general birds of paſſage, and it is moſt probable perform their journies acroſs the ocean as well on the water as in the air. Thoſe that migrate to this country, on the approach of winter, are ſeldom found ſo well taſted or ſo fat as the fowls that continue with us the year round: their fleſh is often lean, and ſtill oftner fiſhy; which flavour it has probably contracted in the journey, as their food in the lakes of Lapland, from whence they deſcend, is generally of the inſect kind.

As ſoon as they arrive among us, they are generally ſeen flying in flocks to make a ſurvey of thoſe lakes where they intend to take up their reſidence for the winter. In the choice of theſe they have two objects in view; to be near their food, and yet remote from interruption. Their chief aim is to chuſe ſome lake in the neighbourhood of a marſh where there is at the ſame time a cover of woods and where inſects are found in greateſt abundance. Lakes, therefore, with a marſh on one ſide and a wood on the other, are ſeldom without vaſt quantities of wild fowl; and where a couple are ſeen at any time, that is a ſufficient inducement to bring hundreds of others. The ducks flying in the air are often lured down from their heights by the loud voice of the mallard from below. Nature ſeems to have furniſhed this bird with very particular faculties for calling. The wind pipe, where it begins to enter the lungs, opens into a kind of bony cavity, where the ſound is reflected as in a muſical inſtrument, and is heard a great way off. To this call all the ſtragglers reſort; and in a week or a fortnight's time, a lake that before was quite naked is black with water-fowl, that have left their Lapland retreats to keep company with our ducks who never ſtirred from home.

They generally chuſe that part of the lake where they are inacceſſible to the approach of the fowler, in which they all appear huddled together, extremely buſy and very loud. What it is can employ them all the day is not eaſy to gueſs. There is no food for them at the place where they ſit and cabal thus, as they chuſe the middle of the lake; and as for courtſhip, the ſeaſon for that is not yet come; ſo that it is wonderful what can ſo buſily keep them occupied. Not one of them ſeems a moment at reſt. Now purſuing one another, now ſcreaming, then all up at once, then down again; the whole ſeems one ſtrange ſcene of buſtle with nothing to do.

They frequently go off in a more private manner by night to feed in the adjacent meadows and ditches, which they dare not venture to approach by day. In theſe nocturnal adventures they are often taken; for, though a timorous bird, yet they are eaſily deceived, and every ſpringe ſeems to ſucceed in taking them. But the greateſt quantities are taken in decoys; which, though well known near London, are yet untried in the remoter parts of the country. The manner of making and managing a decoy is as follows.

A place is to be choſen for this purpoſe far remote from the common highway and all noiſe

of people. A decoy is beſt where there is a large pond ſurrounded by a wood, and beyond that a marſhy and uncultivated country. When the place is choſen, the pool, if poſſible, is to be planted round with willows, unleſs a wood anſwers the purpoſe of ſhading it on every ſide. On the ſouth and north ſide of this pool are two, three, or four ditches or channels, made broad towards the pool, and growing narrower till they end in a point. Theſe channels are to be covered over with nets, ſupported by hooped ſticks bending from one ſide to the other; ſo that they form a vault or arch growing narrower and narrower to the point, where it is terminated by a tunnel-net, like that in which fiſh are caught in weirs. Along the banks of theſe channels ſo netted over, which are called pipes, many hedges are made of reeds ſlanting to the edge of the channel, the acute angles to the ſide next the pool. The whole apparatus alſo is to be hidden from the pool by a hedge of reeds along the margin, behind which the fowler manages his operations. The place being fitted in this manner, the fowler is to provide himſelf with a number of wild ducks made tame, which are called decoys. Theſe are always to be fed at the mouth or entrance of the pipe, and to be accuſtomed to come at a whiſtle.

As ſoon as the evening is ſet in, *the decoy riſes*, as they term it, and the wild fowl feed during the night. If the evening be ſtill, the noiſe of their wings, during their flight, is heard at a very great diſtance, and produces no unpleaſing ſenſation. The fowler, when he finds a fit opportunity, and ſees his decoy covered with fowl, walks about the pool, and obſerves into what pipe the birds gathered in the pool may be enticed or driven. Then caſting hemp-ſeed, or ſome ſuch ſeed as will float on the ſuface of the water, at the entrance and up along the pipe, he whiſtles to his decoy-ducks, who inſtantly obey the ſummons, and come to the entrance of the pipe, in hopes of being fed as uſual. Thither alſo they are followed by a whole flock of wild ones, who little ſuſpect the danger preparing againſt them. Their ſenſe of ſmelling however is very exquiſite; and they would ſoon diſcover their enemy, but that the fowler always keeps a piece of turf burning at his noſe, againſt which he breathes; and this prevents the effluvia of his perſon from reaching their exquiſite ſenſes. The wild ducks, therefore, purſuing the decoy-ducks, are led into the broad mouth of the channel or pipe, nor have the leaſt ſuſpicion of the man who keeps hidden behind one of the hedges. When they

have got up the pipe however, finding it grow more and more narrow, they begin to ſuſpect danger, and would return back; but they are now prevented by the man, who ſhews himſelf at the broad end below. Thither, therefore, they dare not return; and riſe they may not, as they are kept by the net above from aſcending. The only way left them, therefore, is the narrow funnelled net at the bottom; into this they fly, and there they are taken.

It often happens, however, that the wild-fowl are in ſuch a ſtate of ſleepineſs or dozing, that they will not follow the decoy-ducks. Uſe is then generally made of a dog who is taught his leſſon. He paſſes backward and forward between the reed-hedges, in which there are little holes, both for the decoy-man to ſee and for the little dog to paſs through. This attracts the eye of the wild fowl; who, prompted by curioſity, advance towards this little animal, while he all the time keeps playing among the reeds, nearer and nearer the funnel, till they follow him too far to recede. Sometimes the dog will not attract their attention till a red handkerchief, or ſomething very ſingular, be put about him. The decoy-ducks never enter the funnel-net with the reſt, being taught to dive under water as ſoon as the reſt are driven in.

The general ſeaſon for catching fowl in decoys is from the latter end of October till February. The taking them earlier is prohibited by an act of George the Second, which impoſes a penalty of five ſhillings for every bird deſtroyed at any other ſeaſon.

The Lincolnſhire decoys are commonly let at a certain annual rent, from five pounds to twenty pounds a year; and ſome even amount to thirty. Theſe principally contribute to ſupply the markets of London with wild-fowl. The number of ducks, wigeon, and teal, that are ſent thither is amazing. Above thirty thouſand have been ſent up in one ſeaſon from ten decoys in the neighbourhood of Wainfleet. This quantity makes them ſo cheap on the ſpot, that it is aſſerted, the ſeveral decoy-men would be glad to contract for years to deliver their ducks at the next town for ten-pence the couple.

To this manner of taking wild-fowl in England, I will ſubjoin another ſtill more extraordinary, frequently practiſed in China. Whenever the fowler ſees a number of ducks ſettled in any particular plaſh of water, he ſends off two or three gourds to float among them. Theſe gourds reſemble our pompions; but, being made hollow, they ſwim on the ſurface

of the water; and on one pool there may ſometimes be ſeen twenty or thirty of theſe gourds floating together. The fowl at firſt are a little ſhy of coming near them; but by degrees they come nearer; and as all birds at laſt grow familiar with a ſcare-crow, the ducks gather about theſe, and amuſe themſelves by whetting their bills againſt them. When the birds are as familiar with the gourds as the fowler could wiſh, he then prepares to deceive them in good earneſt. He hollows out one of theſe gourds large enough to put his head in; and, making holes to breathe and ſee through, he claps it on his head. Thus accoutred, he wades ſlowly into the water, keeping his body under, and nothing but his head in the gourd above the ſurface; and in that manner moves imperceptibly towards the fowls, who ſuſpect no danger. At laſt, however, he fairly gets in among them; while they, having been long uſed to ſee gourds, take not the leaſt fright while the enemy is in the very midſt of them; and an inſiduous enemy he is; for ever as he approaches a fowl, he ſeizes it by the legs, and draws it in a jerk under water. There he faſtens it under his girdle, and goes to the next, till he has thus loaded himſelf with as many as he can carry away. When he

has got his quantity, without ever attempting to diſturb the reſt of the fowls on the pool, he ſlowly moves off again; and in this manner pays the flock three or four viſits in a day. Of all the various artifices for catching fowl, this ſeems likely to be attended with the greateſt ſucceſs, as it is the moſt practiſed in China.

CHAP.

## CHAP. XIII.

### Of the King-Fiſher.

I Will conclude this hiſtory of birds with one that ſeems to unite in itſelf ſomewhat of every claſs preceding. It ſeems at once poſſeſſed of appetites for prey like the rapacious kinds, with an attachment to water like the birds of that element. It exhibits in its form the beautiful plumage of the peacock, the ſhadings of the humming-bird, the bill of the crane, and the ſhort legs of the ſwallow. The bird I mean is the King-Fiſher, of which many extraordinary falſehoods have been propagated; and yet of which many extraordinary things remain to be ſaid that are actually true.

The king-fiſher is not much larger than a ſwallow; its ſhape is clumſy; the legs diſproportionably ſmall, and the bill diſproportionably long; it is two inches from the baſe to the tip; the upper chap black and the lower yellow; but the colours of this bird attone for its inelegant form; the crown of the head and the coverts of the wings are of a deep blackiſh green, ſpotted with bright azure; the back and tail are of the moſt reſplendent azure; the whole under-ſide of the body is orange-coloured; a

broad mark of the ſame paſſes from the bill beyond the eyes; beyond that is a large white ſpot: the tail is ſhort, and conſiſts of twelve feathers of a rich deep blue; the feet are of a reddiſh yellow, and the three joints of the outmoſt toe adhere to the middle toe, while the inner toe adheres only by one.

From the diminutive ſize, the ſlender ſhort legs, and the beautiful colours of this bird, no perſon would be led to ſuppoſe it one of the moſt rapacious little animals that ſkims the deep. Yet it is for ever on the wing, and feeds on fiſh, which it takes in ſurprizing quantities, when we conſider its ſize and figure. It chiefly frequents the banks of rivers, and takes its prey after the manner of the oſprey, balancing itſelf at a certain diſtance above the water for a conſiderable ſpace, then darting into the deep, and ſeizing the fiſh with inevitable certainty. While it remains ſuſpended in the air, in a bright day, the plumage exhibits a beautiful variety of the moſt dazzling and brilliant colours. It might have been this extraordinary beauty that has given riſe to fable; for wherever there is any thing uncommon, fancy is always willing to encreaſe the wonder.

Of this bird it has been ſaid that ſhe built her neſt on the water, and thus in a few days hatched and produced her young. But, to be

uninterrupted in this taſk, ſhe was ſaid to be poſſeſſed of a charm to allay the fury of the waves; and during this period the mariner might ſail with the greateſt ſecurity. The ancient poets are full of theſe fables; their hiſtorians are not exempt from them. Cicero has written a long poem in praiſe of the halcyon, of which there remains but two lines. Even the emperor Gordian has written a poem on this ſubject, of which we have nothing remaining. Theſe fables have been adopted each by one of the earlieſt fathers of the church. "Behold," ſays St. Ambroſe, "the little bird which in "the midſt of the winter lays her eggs on the "ſand by the ſhore. From that moment the "winds are huſhed; the ſea becomes ſmooth; "and the calm continues for fourteen days. "This is the time ſhe requires; ſeven days to "hatch, and ſeven days to foſter her young. "Their Creator has taught theſe little animals "to make their neſt in the midſt of the moſt "ſtormy ſeaſon, only to manifeſt his kindneſs "by granting them a laſting calm. The ſea-"men are not ignorant of this bleſſing; they "call this interval of fair weather their *halcyon* "*days*; and they are particularly careful to "ſeize the opportunity, as then they need fear "no interruption." This, and an hundred other

inſtances might be given of the credulity of mankind with reſpect to this bird; they entered into ſpeculations concerning the manner of her calming the deep, the formation of her neſt, and her peculiar ſagacity; at preſent we do not ſpeculate becauſe we know, with reſpect to our king-fiſher, that moſt of the facts are falſe. It may be alledged, indeed, with ſome ſhew of reaſon, that the Halcyon of the ancients was a different bird from our king-fiſher; it may be urged, that many birds, eſpecially on the Indian ocean, build a floating neſt upon the ſea; but ſtill, the hiſtory of the ancient halcyon is clogged with endleſs fable; and it is but an indifferent method to vindicate falſehood by ſhewing that a part of the ſtory is true.

The king-fiſher with which we are acquainted at preſent, has none of thoſe powers of allaying the ſtorm, or building upon the waves; it is contented to make its neſt on the banks of rivers, in ſuch ſituations as not to be affected by the riſing of the ſtream. When it has found a place for its purpoſe, it hollows out with its bill a hole about a yard deep; or if it finds the deſerted hole of a rat, or one cauſed by the root of a tree decaying, it takes quiet poſſeſſion. This hole it enlarges at the bottom to a good ſize; and, lining it with the down of the willow,

lays its eggs there without any farther preparation.

Its neſt, or rather hole, is very different from that deſcribed by the ancients, by whom it is ſaid to be made in the ſhape of a long necked gourd of the bones of the ſea-needle. The bones, indeed, are found there in great quantities as well as the ſcales of fiſhes; but theſe are the remains of the bird's food, and by no means brought there for the purpoſes of warmth or convenience. The king-fiſher, as Bellonius ſays, feeds upon fiſh, but is incapable of digeſting the bones and ſcales, which he throws up again as eagles and owls are ſeen to do a part of their prey. Theſe fill the bird's neſt of courſe; and, although they ſeem as if deſignedly placed there, are only a kind of nuiſance.

In theſe holes, which, from the remains of fiſh brought there, are very fœtid, the king-fiſher is often found with from five eggs to nine. There the female continues to hatch even though diſturbed; and though the neſt be robbed, ſhe will again return and lay there. "I have had one of thoſe females brought me," ſays Reaumur, "which was taken from her neſt "about three leagues from my houſe. After "admiring the beauty of her colours, I let her

"fly again, when the fond creature was in-
"ſtantly ſeen to return back to the neſt where
"ſhe had juſt before been made a captive.
"There joining the male, ſhe again began to
"lay, though it was for the third time, and
"though the ſeaſon was very far advanced. At
"each time ſhe had ſeven eggs. The older
"the neſt is, the greater quantity of fiſh-bones
"and ſcales does it contain: theſe are diſpoſed
"without any order; and ſometimes take up
"a good deal of room."

The female begins to lay early in the ſeaſon; and excludes her firſt brood about the beginning of April. The male, whoſe fidelity exceeds even that of the turtle, brings her large proviſions of fiſh while ſhe is thus employed; and ſhe, contrary to moſt other birds, is found plump and fat at that ſeaſon. The male, that uſed to twitter before this, now enters the neſt as quietly and as privately as poſſible. The young ones are hatched at the expiration of twenty days; but are ſeen to differ as well in their ſize as in their beauty.

As the ancients have had their fables concerning this bird, ſo have the modern vulgar. It is an opinion generally received among them that the fleſh of the king-fiſher will not corrupt, and that it will even baniſh all vermin.

This has no better foundation than that which is ſaid of its always pointing, when hung up dead, with its breaſt to the north. The only truth which can be affirmed of this bird when killed is, that its fleſh is utterly unfit to be eaten; while its beautiful plumage preſerves its luſtre longer than that of any other bird we know.

Having thus given a ſhort hiſtory of birds, I own I cannot take leave of this moſt beautiful part of the creation without reluctance. Theſe ſplendid inhabitants of air poſſeſs all thoſe qualities that can ſooth the heart and cheer the fancy. The brighteſt colours, the roundeſt forms, the moſt active manners, and the ſweeteſt muſic. In ſending the imagination in purſuit of theſe, in following them to the chirruping grove, the ſcreaming precipice, or the glaſſy deep, the mind naturally loſt the ſenſe of its own ſituation, and, attentive to their little ſports, almoſt forgot the TASK of deſcribing them. Innocently to amuſe the imagination in this dream of life is wiſdom; and nothing is uſeleſs that, by furniſhing mental employment, keeps us for a while in oblivion of thoſe ſtronger appetites that lead to evil. But every rank and ſtate of mankind may find ſomething to imitate in thoſe delightful ſongſters, and we

may not only employ the time, but mend our lives by the contemplation. From their courage in defence of their young, and their aſſiduity in incubation, the coward may learn to be brave, and the raſh to be patient. The inviolable attachment of ſome to their companions may give leſſons of fidelity; and the connubial tenderneſs of others, be a monitor to the incontinent. Even thoſe that are tyrants by nature never ſpread capricious deſtruction; and, unlike man, never inflict a pain but when urged by neceſſity.

# THE NATURAL HISTORY OF FISHES.

## PART I.

### *THE CETACEOUS KIND.*

# AN HISTORY OF FISHES.

## CHAP. I.

### Of Fiſhes in General.

THE ocean is the great receptacle of fiſhes. It has been thought, by ſome, that all fiſh are naturally of that ſalt element; and that they have mounted up into freſh water, by ſome accidental migration. A few ſtill ſwim up rivers to depoſit their ſpawn; but of the great body of fiſhes, of which the ſize is enormous and the ſhoals are endleſs, thoſe all keep to the ſea, and would quickly expire in freſh water. In that extenſive and undiſcovered abode, millions reſide, whoſe manners are a ſecret to us, and whoſe very form is unknown. The curioſity of mankind, indeed, has drawn ſome from

their depths, and his wants many more: with the figure of theſe at leaſt he is acquainted; but for their purſuits, migrations, ſocieties, antipathies, pleaſures, times of geſtation, and manner of bringing forth, theſe all are hidden in the turbulent element that protects them.

The number of fiſh to which we have given names, and of the figure, at leaſt, of which we know ſomething, according to Linnæus, are above four hundred. Thus to appearance indeed the hiſtory of fiſh is tolerably copious; but when we come to examine, it will be found that of the greateſt part of theſe we know very little. Thoſe qualities, ſingularities or advantages, that render animals worth naming, ſtill remain to be diſcovered. The hiſtory of fiſhes, therefore, has little in it entertaining: for our philoſophers hitherto, inſtead of ſtudying their nature, have been employed in encreaſing their catalogues; and the reader, inſtead of obſervations or facts, is preſented with a long liſt of names, that diſguſt him with their barren ſuperfluity. It muſt diſpleaſe him to ſee the language of a ſcience encreaſing, while the ſcience itſelf has nothing to repay the encreaſing tax laid upon his memory.

Moſt fiſh offer us the ſame external form; ſharp at either end, and ſwelling in the middle;

by which they are enabled to traverſe the fluid which they inhabit, with greater celerity and eaſe. That peculiar ſhape which Nature has granted to moſt fiſhes, we endeavour to imitate in ſuch veſſels as are deſigned to ſail with the greateſt ſwiftneſs: however, the progreſs of a machine moved forward in the water by human contrivance, is nothing to the rapidity of an animal deſtined by Nature to reſide there. Any of the large fiſh overtake a ſhip in full ſail with great eaſe, play round it without effort, and outſtrip it at pleaſure. Every part of the body ſeems exerted in this diſpatch; the fins, the tail, and the motion of the whole back-bone, aſſiſt progreſſion; and it is to that flexibility of body at which art cannot arrive, that fiſhes owe their great velocity.

The chief inſtruments in a fiſh's motion, are the fins; which, in ſome fiſh, are much more numerous than in others. A fiſh completely fitted for ſailing, is furniſhed with not leſs than two pair; alſo three ſingle fins, two above and one below. Thus equipped, it migrates with the utmoſt rapidity, and takes voyages of a thouſand leagues in a ſeaſon. But it does not always happen that ſuch fiſh as have the greateſt number of fins have the ſwifteſt motion: the ſhark is thought to be one of the ſwifteſt ſwim-

mers, yet it wants the ventral or belly fins; the haddock does not move ſo ſwift, yet it is completely fitted for motion.

But the fins ſerve not only to aſſiſt the animal in progreſſion, but in riſing or ſinking, in turning, or even leaping out of the water. To anſwer theſe purpoſes, the pectoral fins ſerve, like oars, to puſh the animal forward; they are placed at ſome little diſtance behind the opening of the gills; they are generally large and ſtrong, and anſwer the ſame purpoſes to the fiſh in the water, as wings do to a bird in the air. With the help of theſe, and by their continued motion, the flying-fiſh is ſometimes ſeen to riſe out of the water, and to fly above an hundred yards; till, fatigued with its exertions, it is obliged to ſink down again. Theſe alſo ſerve to balance the fiſh's head, when it is too large for the body, and keep it from tumbling prone to the bottom, as is ſeen in large headed fiſhes, when the pectoral fins are cut off. Next theſe are ſeen the ventral fins, placed toward the lower part of the body, under the belly: theſe are always ſeen to lie flat on the water, in whatever ſituation the fiſh may be; and they ſerve rather to raiſe or depreſs the fiſh in its element, than to aſſiſt progreſſive motion. The dorſal fin is ſituated along the ridge of the back; and ſerves

to keep it in equilibrio, as alſo to aſſiſt its progreſſive motion. In many fiſhes this is wanting; but in all flat fiſhes it is very large, as the pectoral fins are proportionably ſmall. The anal fin occupies that part of the fiſh which lies between the anus and the tail; and this ſerves to keep the fiſh in its upright or vertical ſituation. Laſtly, the tail, which in ſome fiſhes is flat, and upright in others, ſeems the grand inſtrument of motion: the fins are but all ſubſervient to it, and give direction to its great impetus, by which the fiſh ſeems to dart forward with ſo much velocity. To explain all this by experiment; a carp is taken, and put into a large veſſel. The fiſh, in a ſtate of repoſe, ſpreads all its fins, and ſeems to reſt upon its pectoral and ventral fins near the bottom: if the fiſh folds up, for it has the power of folding, either of its pectoral fins, it inclines to the ſame ſide; folding the right pectoral fin, the fiſh inclines to the right ſide; folding the left fin, it inclines to that ſide in turn. When the fiſh deſires to have a retrogade motion, ſtriking with the pectoral fins, in a contrary direction, effectually produces it. If the fiſh deſires to turn, a blow from the tail ſends it about; but if the tail ſtrikes both ways, then the motion is progreſſive. In purſuance

of theſe obſervations, if the dorſal and ventral fins be cut off, the fiſh reels to the right and left, and endeavours to ſupply its loſs by keeping the reſt of its fins in conſtant employment. If the right pectoral fin be cut off, the fiſh leans to that ſide; if the ventral fin on the ſame ſide be cut away, then it loſes its equilibrium entirely. When the tail is cut off, the fiſh loſes all motion, and gives itſelf up to where the water impels it.

From hence it appears, that each of theſe inſtruments has a peculiar uſe aſſigned it; but, at the ſame time, that they all conſpire to aſſiſt each other's motions. Some fiſh are poſſeſſed of all, whoſe motions are yet not the ſwifteſt; others have but a part, and yet dart in the water with great rapidity. The number, the ſize, and the ſituation of the fins, therefore, ſeem rather calculated to correſpond with the animal's figure, than ſolely to anſwer the purpoſes of promoting its ſpeed. Where the head is large and heavy, there the pectoral fins are large, and placed forward, to keep it from overſetting. Where the head is ſmall, or produced out into a long beak, and therefore not too heavy for the tail, the pectoral fins are ſmall, and the ventral fins totally wanting.

As moſt animals that live upon land are fur-

niſhed with a covering to keep off the injuries of the weather, ſo all that live in the water are covered with a ſlimy, glutinous matter, that, like a ſheath, defends their bodies from the immediate contact of the ſurrounding fluid. This ſubſtance may be conſidered as a ſecretion from the pores of the animal's body; and ſerving, not only to defend, but to aſſiſt the fiſh's eaſy progreſs through the water. Beneath this, in many kinds, is found a ſtrong covering of ſcales, that, like a coat of mail, defend it ſtill more powerfully; and under that, before we come to the muſcular parts of the body, an oily ſubſtance, which ſupplies the requiſite warmth and vigour.

The fiſh, thus protected and fitted for motion in its natural element, ſeems as well furniſhed with the means of happineſs as quadrupedes or birds; but if we come to examine its faculties more nearly, we ſhall find it very much their inferior. The ſenſe of touching, which beaſts and birds have in a ſmall degree, the fiſh, covered up in its own coat of mail, can have but little acquaintance with.

The ſenſe of ſmelling, which in beaſts is ſo exquiſite, and among birds is not wholly unknown, ſeems given to fiſhes in a very moderate proportion. It is true, that all fiſhes

have one or more noſtrils; and even thoſe that have not the holes perceptible without, yet have the proper formation of the bones for ſmelling within. But as air is the only medium we know for the diſtribution of odours, it cannot be ſuppoſed that theſe animals, reſiding in water, can be poſſeſſed of any power of being affected by them. If they have any perception of ſmells, it muſt be in the ſame manner as we diſtinguiſh by our taſte; and, it is probable; the olfactory membrane in fiſh ſerves them inſtead of a diſtinguiſhing palate: by this they judge of ſubſtances, that, firſt tincturing the water with their vapours, are thus ſent to the noſtrils of the fiſh, and no doubt produce ſome kind of ſenſation. This moſt probably muſt be the uſe of that organ in thoſe animals; as otherwiſe there would be the inſtruments of a ſenſe provided for them, without any power in them of enjoyment.

As to taſting they ſeem to make very little diſtinction; the palate of moſt fiſh is hard and bony, and conſequently incapable of the powers of reliſhing different ſubſtances. This ſenſe among quadrupedes, who poſſeſs it in ſome degree, ariſes from the ſoft pliancy of the organ, and the delicacy of the ſkin which covers the inſtruments of taſting; it may be conſidered, in

them, as a more perfect and delicate kind of feeling: in the bony palate of fish, therefore, all powers of distinguishing are utterly taken away; and we have accordingly often seen these voracious animals swallow the fisherman's plummet instead of the bait.

Hearing in fishes is found still more imperfect, if it be found at all. Certain it is, that anatomists have not been able to discover, except in the whale kind, the smallest traces of an organ, either within or without the head of fishes. It is true that in the centre of the brain of some fishes are found now and then some little bones, the number and situation of which are entirely accidental. These bones, Mr. Klein has supposed to constitute the organ of hearing; but if we consider their entire dissimilitude to the bones that serve for hearing in other animals, we shall be of another opinion. The greatest number of fishes are deprived of these bones entirely: some fish have them in small numbers, and others in abundance; yet neither testify any excellence or defect in hearing. Indeed, of what advantage would this sense be to animals that are incapable of making themselves heard? They have no voice to communicate with each other, and consequently have no need of an organ for hearing. Mr. Gouan,

who kept ſome gold fiſhes in a vaſe, informs us, that, whatever noiſe he made, he could neither diſturb nor terrify them: he hallowed as loud as he could, putting a piece of paper between his mouth and the water, to prevent the vibrations from affecting the ſurface, and the fiſhes ſtill ſeemed inſenſible: but when the paper was removed, and the ſound had its full play upon the water, the fiſhes ſeemed inſtantly to feel the change, and ſhrunk to the bottom. From this we may learn, that fiſhes are as deaf as they are mute; and that when they ſeem to hear the call of a whiſtle or a bell at the edge of a pond, it is rather the vibrations of the ſound that affect the water, by which they are excited, than any ſounds that they hear.

Seeing ſeems to be the ſenſe fiſhes are poſſeſſed of in the greateſt degree; and yet even this ſeems obſcure, if we compare it to that of other animals. The eye, in almoſt all fiſh, is covered with the ſame tranſparent ſkin that covers the reſt of the head; and which probably ſerves to defend it in the water, as they are without eye-lids. The globe is more depreſſed anteriorly, and is furniſhed behind with a muſcle, which ſerves to lengthen or flatten it, according to the neceſſities of the animal. The chryſtaline humour, which in quadrupedes is

flat and of the ſhape of a button mould, in fiſhes is as round as a pea; or ſometimes oblong, like an egg. From all this it appears, that fiſh are extremely near-ſighted; and that, even in the water, they can ſee objects at a very ſmall diſtance. This diſtance might very eaſily be aſcertained, by comparing the refraction of bodies in the water, with that formed by a lens that is ſpherical. Thoſe unſkilled in mathematical calculations, will have a general idea of this, from the glaſſes uſed by near-ſighted people. Thoſe whoſe chryſtaline humour is too convex, or, in other words, too round, are always very near-ſighted; and obliged to uſe concave glaſſes, to correct the imperfections of Nature. The chryſtaline humour of fiſh is ſo round that it is not in the power of any glaſſes, much leſs of water, to correct their viſion. This chryſtaline humour in fiſhes all muſt have ſeen; being that little hard pea-like ſubſtance which is found in their eyes after boiling. In the natural ſtate it is tranſparent, and not much harder than a jelly.

From all this, it appears how far fiſh fall behind terreſtrial animals in their ſenſations, and conſequently in their enjoyments. Even their brain, which is by ſome ſuppoſed to be of a ſize with every animal's underſtanding, ſhews

that fiſh are inferior even to birds in this particular. It is divided into three parts, ſurrounded with a whitiſh froth, and gives off nerves as well to the ſenſe of ſight as of ſmelling. In ſome fiſh it is grey, in others white; in ſome it is flatted, in others round; but in all extremely ſmall, compared to the bulk of the animal.

Thus Nature ſeems to have fitted theſe animals with appetites and powers of an inferior kind; and formed them for a ſort of paſſive exiſtence in the obſcure and heavy element to which they are conſigned. To preſerve their own exiſtence, and to continue it to their poſterity, fill up the whole circle of their purſuits and enjoyments; to theſe they are impelled rather by neceſſity than choice, and ſeem mechanically excited to every fruition. Their ſenſes are incapable of making any diſtinctions; but they drive forward in purſuit of whatever they can ſwallow, conquer, or enjoy.

A ceaſeleſs deſire of food ſeems to give the ruling impulſe to all their motions. This appetite impels them to encounter every danger; and indeed their rapacity ſeems inſatiable. Even when taken out of the water, and almoſt expireing, they greedily ſwallow the very bait by which they were allured to deſtruction.

The maw is, in general, placed next the

mouth; and though poſſeſſed of no ſenſible heat, is however endued with a ſurprizing faculty of digeſtion. Its digeſtive power ſeems, in ſome meaſure, to encreaſe with the quantity of food it is ſupplied with; a ſingle pike having been known to devour an hundred roaches in three days. Its faculties alſo are as extraordinary; for it digeſts not only fiſh, but much harder ſubſtances; prawns, crabs, and lobſters, ſhells and all. Theſe the cod or the ſturgeon will not only devour, but diſſolve down, though their ſhells are ſo much harder than the ſides of the ſtomach which contains them. This amazing faculty in the cold maw of fiſhes has juſtly excited the curioſity of philoſophers; and has effectually overturned the ſyſtem of thoſe, who ſuppoſed that the heat of the ſtomach was alone a ſufficient inſtrument for digeſtion. The truth ſeems to be, and ſome experiments of the ſkilful Dr. Hunter ſeem to evince, that there is a power of animal aſſimilation lodged in the ſtomach of all creatures, which we can neither deſcribe nor define, converting the ſubſtances they ſwallow into a fluid fitted for their own peculiar ſupport. This is done neither by trituration, nor by warmth, nor by motion, nor by a diſſolving fluid, nor by their united efforts; but by ſome principle in the ſtomach yet unknown, which

acts in a different manner from all kinds of artificial maceration. The meat taken into the ſtomach or maw is often ſeen, though very near being digeſted, ſtill to retain its original form; and ready for a total diſſolution, while it appears to the eye as yet untouched by the force of the ſtomach. This animal power is lodged in the maw of fiſhes, in a greater degree than in any other creatures; their digeſtive powers are quick, and their appetites ever are craving.

Yet, though fiſh are thus hungry, and for ever prowling, no animals can ſuffer the want of food for ſo long a time. The gold and ſilver fiſh we keep in vaſes ſeem never to want any nouriſhment at all; whether it be that they feed on the water-inſects, too minute for our obſervation, or that water alone is a ſufficient ſupply, is not evident; but they are often ſeen for months without apparent ſuſtenance. Even the pike, the moſt voracious of fiſhes, will live in a pond where there is none but himſelf; and, what is more extraordinary, will be often found to thrive there.

Still, however, fiſh are of all other animals the moſt voracious and inſatiable. Whatever any of them is able to ſwallow poſſeſſed of life, ſeems to be conſidered as the moſt deſirable food. Some that have very ſmall mouths feed

upon worms and the ſpawn of other fiſh: others, whoſe mouths are larger, ſeek larger prey; it matters not of what kind, whether of another or their own. Thoſe with the largeſt mouths purſue almoſt every thing that has life; and often meet each other in fierce oppoſition, when the fiſh with the largeſt ſwallow comes off with the victory, and devours its antagoniſt.

Thus are they irritated by the continual deſire of ſatisfying their hunger; and the life of a fiſh, from the ſmalleſt to the greateſt, is but one ſcene of hoſtility, violence and evaſion. But the ſmaller fry ſtand no chance in the unequal combat; and their uſual way of eſcaping, is by ſwimming into thoſe ſhallows where the greater are unable or too heavy to purſue. There they become invaders in turn, and live upon the ſpawn of larger fiſh, which they find floating upon the ſurface of the water: yet there are dangers attending them in every place. Even in the ſhallows, the muſcle, the oyſter, and the ſcallop, lie in ambuſh at the bottom, with their ſhells open, and whatever little fiſh inadvertently approaches into contact, they at once cloſe their ſhells upon him, and devour the impriſoned prey at their leiſure.

Nor is the purſuit of fiſhes, like that of terreſtrial animals, confined to a ſingle region, or

to one effort: ſhoals of one ſpecies follow thoſe of another through vaſts tracts of ocean, from the vicinity of the pole even down to the equator. Thus the cod, from the banks of Newfoundland, purſues the whiting, which flies before it even to the ſouthern ſhores of Spain. The cachalot is ſaid, in the ſame manner, to purſue a ſhoal of herrings, and to ſwallow thouſands at a gulp.

This may be one cauſe of the annual migration of fiſhes from one part of the ocean to the other; but there are other motives, which come in aid of this alſo. Fiſhes may be induced to change the place of their reſidence, for one more ſuited to their conſtitutions, or more adapted to depoſiting their ſpawn. It is remarkable that no fiſh are fond of very cold waters, and generally frequent thoſe places where it is warmeſt. Thus, in ſummer, they are ſeen in great numbers in the ſhallows near the ſhore, where the ſun has power to warm the water to the bottom; on the contrary, in winter, they are found towards the bottom in the deep ſea, for the cold of the atmoſphere is not ſufficiently penetrating to reach them at thoſe great depths. Cold produces the ſame effect upon freſh-water fiſhes; and when they are often ſeen dead after ſevere froſts, it is moſt probable that

they have been killed by the ſeverity of the cold, as well as by their being excluded by the ice from air.

All fiſh live in the water; yet they all ſtand in need of air for their ſupport. Thoſe of the whale kind, indeed, breathe the air in the ſame manner as we do, and come to the ſurface every two or three minutes to take a freſh inſpiration: but thoſe which continue entirely under water, are yet under a neceſſity of being ſupplied with air, or they will expire in a very few minutes. We ſometimes ſee all the fiſh of a pond killed, when the ice every where covers the ſurface of the water, and thus keeps off the air from the ſubjacent fluid. If a hole be made in the ice, the fiſh will be ſeen to come all to that part, in order to take the benefit of a freſh ſupply. Should a carp, in a large vaſe of water, be placed under an air-pump, and then be deprived of its air, during the operation a number of bubbles will be ſeen ſtanding upon the ſurface of the fiſh's body; ſoon after the animal will appear to breathe ſwifter and with greater difficulty; it will then be ſeen to riſe towards the ſurface to get more air; the bubbles on its ſurface begin to diſappear; the belly, that was before ſwolen, will then fall of a ſudden, and the animal ſinks expiring and convulſed at the bottom.

So very neceſſary is air to all animals, but particularly to fiſh, that, as was ſaid, they can live but a few minutes without it: yet nothing is more difficult to be accounted for, than the manner in which they obtain this neceſſary ſupply. Thoſe who have ſeen a fiſh in the water, muſt remember the motion of its lips and its gills, or at leaſt of the bones on each ſide that cover them. This motion in the animal is, without doubt, analogous to our breathing; but it is not air, but water, that the fiſh actually ſucks in and ſpouts out through the gills at every motion. The manner of its breathing is thus: the fiſh firſt takes a quantity of water by the mouth, which is driven to the gills; theſe cloſe and keep the water ſo ſwallowed from returning by the mouth; while the bony covering of the gills prevents it from going through them, until the animal has drawn the proper quantity of air from the body of water thus impriſoned: then the bony covers open and give it a free paſſage; by which means alſo the gills again are opened and admit a freſh quantity of water. Should the fiſh be prevented from the free play of its gills, or ſhould the bony covers be kept from moving, by a ſtring tied round them, the animal would ſoon fall into convulſions and die in a few minutes.

But though this be the general method of

explaining reſpiration in fiſhes, the difficulty remains to know what is done with this air, which the fiſh in this manner ſeparates from the water. There ſeems no receptacle for containing it; the ſtomach being the chief cavity within the body, is too much filled with aliment for that purpoſe There is indeed a cavity, and that a pretty large one, I mean the air-bladder or ſwim, which may ſerve to contain it for vital purpoſes; but that our philoſophers have long deſtined to a very different uſe. The uſe univerſally aſſigned to the air-bladder is the enabling the fiſh to riſe or ſink in the water at pleaſure, as that is dilated or compreſſed. The uſe aſſigned by the ancients for it was to come in aid of the lungs, and to remain as a kind of ſtore-houſe of air to ſupply the animal in its neceſſities. I own my attachment to this laſt opinion; but let us exhibit both with their proper ſhare of evidence, and the reader muſt be left to determine.

The air-bladder is deſcribed as a bag filled with air, ſometimes compoſed of one, ſometimes of two, and ſometimes of three diviſions, ſituated towards the back of the fiſh, and opening into the maw or the gullet. Thoſe who contend that this bag is deſigned for raiſing or depreſſing the fiſh in the water, build upon the following experiment. A carp being put into the

air-pump, and the air exhauſted, the bladder is ſaid to expand itſelf to ſuch a degree, that the fiſh ſwells in an extraordinary manner till the bladder burſts, and then the fiſh ſinks, and ever after continues to crawl at the bottom. On another occaſion, the air-bladder was pricked and wounded, which let out its air; upon which the fiſh ſunk to the bottom, and was not ſeen to riſe after. From thence it is inferred, that the uſe of the air-bladder muſt be by ſwelling at the will of the animal, thus to encreaſe the ſurface of the fiſh's body, and thence diminiſhing its ſpecific gravity, to enable it to riſe to the top of the water, and keep there at pleaſure. On the contrary, when the fiſh wants to deſcend, it is, ſay they, but to exhauſt this bladder of its air; and the fiſh being thus rendered ſlimmer and heavier, conſequently ſinks to the bottom.

Such is the account given of the uſe of the air-bladder; no part of which ſeems to me well ſupported. In the firſt place, though nothing is more certain, than that a carp put into the air-pump will ſwell, yet ſo will a mouſe or a frog; and theſe we know to have no air-bladders. A carp will riſe to the ſurface: but ſo will all fiſh that want air, whether they have an air-bladder or not. The air-bladder is ſaid to burſt in the experiment; but that I deny. The

air-bladder is indeed found empty, but it has ſuffered no laceration, and may be diſtended by being blown into like any other bladder that is found. The fiſh after the experiment, I grant, continues to creep at the bottom; and ſo will all fiſh that are ſick and wounded, which muſt be the caſe with this after ſuch an operation. Thus theſe facts prove nothing, but that when the fiſh is killed in an air-pump the air-bladder is found exhauſted; and that it will naturally and neceſſarily be; for the drain of air by which the fiſh is ſupplied in the natural way will neceſſarily oblige it to make uſe of all its hidden ſtores; and, as there is a communication between the gullet and the air-bladder, the air which the latter contains will thus be obviouſly drawn away. But ſtill farther, how comes the air-bladder, according to their hypotheſis, to ſwell under the experiment of the air-pump? What is it that cloſes the aperture of that organ in ſuch a manner as at laſt to burſt it; or what neceſſity has the fiſh for dilating it to that violent degree? At moſt, it only wants to riſe to the ſurface; and that the fiſh can eaſily do without ſo great a diſtention of the air-bladder. Indeed, it ſhould rather ſeem, that the more the air was wanted without, the leſs neceſſity there was for its being uſeleſsly accumulated within; and to

make the modern ſyſtem conſiſtent, the fiſh under the air-pump, inſtead of permitting its bladder to be burſt, would readily give up its contents; which, upon their ſuppoſition, all can do at pleaſure.

But the truth is, the fiſh can neither encreaſe nor diminiſh the quantity of air in its air-bladder at will, no more than we can that which is contained in our ſtomachs. The animal has no one muſcle, much leſs pair of muſcles, for contracting or dilating this organ; its aperture is from the gullet; and what air is put into it muſt remain there till the neceſſities, and not the will, of the animal call it forth as a ſupply.

But, to put the matter paſt a doubt, many fiſh are furniſhed with an air-bladder that continually crawl at the bottom; ſuch as the eel and the flounder; and many more are entirely without any bladder, that ſwim at eaſe in every depth; ſuch as the anchovy and freſh-water gudgeon *. Indeed, the number of fiſh that want this organ is alone a ſufficient proof that it is not ſo neceſſary for the purpoſes of ſwimming; and as the ventral fins, which in all fiſh lie flat upon the water, ſeem fully ſufficient to keep them at all depths, I ſee no great occaſion for this internal philoſophical apparatus for raiſing and depreſs-

* Redi.

ing them. Upon the whole, the air-bladder ſeems adapted for different purpoſes than that of keeping the fiſh at different depths in the water; but whether it be to ſupply them with air when it is wanted from without, or for what other purpoſe, I will not take upon me to determine.

Hitherto we have ſeen fiſh in every reſpect inferior to land animals; in the ſimplicity of their conformation, in their ſenſes, and their enjoyments; but of that humble exiſtence which they have been granted by nature, they have a longer term than any other claſs of animated nature. "Moſt of the diſorders incident "to mankind," ſays Bacon, "ariſe from the "changes and alterations of the atmoſphere; "but fiſhes reſide in an element little ſubject to "change; theirs is an uniform exiſtence; their "movements are without effort, and their life "without labour. Their bones alſo, which are "united by cartilages, admit of indefinite ex-"tenſion; and the different ſizes of animals of "the ſame kind among fiſhes is very various. "They ſtill keep growing; their bodies, in-"ſtead of ſuffering the rigidity of age, which "is the cauſe of natural decay in land animals, "ſtill continue encreaſing with freſh ſupplies; "and as the body grows the conduits of life "furniſh their ſtores in greater abundance.

"How long a fiſh that ſeems to have ſcarce "any bounds put to its growth continues to "live is not aſcertained; perhaps the life of a "man would not be long enough to meaſure "that of the ſmalleſt."

There have been two methods deviſed for determining the age of fiſhes, which are more ingenious than certain; the one is by the circles of the ſcales, the other by the tranſverſe ſection of the back-bone. The firſt method is this. When a fiſh's ſcale is examined through a microſcope, it will be found to conſiſt of a number of circles, one circle within another, in ſome meaſure reſembling thoſe which appear upon the tranſverſe ſection of a tree, and ſuppoſed to offer the ſame information. For as in trees we can tell their age by the number of their circles, ſo in fiſhes we can tell theirs by the number of circles in every ſcale, reckoning one ring for every year of the animal's exiſtence. By this method, Mr. Buffon found a carp, whoſe ſcales he examined, to be not leſs than a hundred years old; a thing almoſt incredible had we not ſeveral accounts in other authors which tend to confirm the diſcovery. Geſner brings us an inſtance of one of the ſame age; and Albertus of one more than double that period.

The age of the ſkate and the ray, that want ſcales, may be known by the other method;

which is, by ſeparating the joints of the back-bone, and then minutely obſerving the number of rings which the ſurface where it was joined exhibits. By this the fiſh's age is ſaid to be known; and perhaps with as much certainty as in the former inſtance.

But how unſatisfactory ſoever theſe marks may be, we have no reaſon to doubt the great age of ſome fiſhes. Thoſe that have ponds often know the oldeſt by their ſuperior ſize. But the longevity of theſe animals is nothing when compared to their fecundity. All ſorts, a few of the larger ones excepted, multiply their kind ſome by hundreds and ſome by millions. There are ſome that bring forth their young alive, and ſome that only produce eggs: the former are rather the leaſt fruitful: yet even theſe are ſeen to produce in great abundance. The viviparous blenny, for inſtance, brings forth two or three hundred at a time, all alive and playing round the parent together. Thoſe who exclude their progeny in a more imperfect ſtate, and produce eggs, which they are obliged to leave to chance, either on the bottom at the edge of the water, or floating on the ſurface where it is deeper, are all much more prolific; and ſeem to proportion their ſtock to the danger there is of its conſumption. Of

theſe eggs thus depoſited, ſcarce one in an hundred brings forth an animal; they are devoured by all the leſſer fry that frequent the ſhores; by aquatic birds near the margin, and by the larger fiſh in deep water. Still, however, there are enough for ſupplying the deep with inhabitants; and, notwithſtanding their own rapacity and that of the fowls of various tribes, the numbers that eſcape are ſufficient to relieve the wants of a very conſiderable part of mankind. Indeed, when we conſider the numbers that a ſingle fiſh is capable of producing, the amount will ſeem aſtoniſhing. If, for inſtance, we ſhould be told of a being ſo very prolific, that in a ſingle ſeaſon it could bring forth as many of its kind as there are inhabitants in England, it would ſtrike us with ſurprize; yet a ſingle cod produces full that number. The cod ſpawns in one ſeaſon, as Lewenhoeck aſſures us, above nine million of eggs or peas contained in one ſingle roe. The flounder is commonly known to produce above one million; and the mackarel above five hundred thouſand. Such an amazing encreaſe, if permitted to come to maturity, would overſtock nature, and even the ocean itſelf would not be able to contain, much leſs to provide for, the half of its inhabitants. But two wiſe purpoſes are anſwered by this amazing encreaſe; it preſerves the ſpecies

in the midſt of numberleſs enemies, and ſerves to furniſh the reſt with a ſuſtenance adapted to their nature.

Fiſhes ſeem, all except the whale-kind, entirely diveſted of thoſe parental ſolicitudes which ſo ſtrongly mark the manners of the more perfect terreſtrial animals. How far they copulate remains as yet a doubt; for though they ſeem to join, yet the male is not furniſhed with any external inſtrument of generation. It is ſaid, by ſome, that his only end in that action is to emit his impregnating milt upon the eggs that at that time fall from the female. He is ſaid to be ſeen purſuing them as they float down the ſtream, and carefully impregnating them one after another. On ſome occaſions alſo the females dig holes in the bottom of rivers and ponds, and there depoſit their ſpawn, which is impregnated by the male in the ſame manner. All this, however, is very doubtful; what we know with certainty of the matter, and that not diſcovered till very lately, is, that the male has two organs of generation that open into the bladder of urine, and that theſe organs do not open into the rectum as in birds, but have a particular aperture of their own*. Theſe organs of generation in the male are

* Vide Gaman de Generatione Piſcium.

empty at ſome ſeaſons of the year; but before the time of ſpawing they are turgid with what is called the milt, and emit the fluid proper for impregnation.

Fiſh have different ſeaſons for depoſiting their ſpawn: ſome, that live in the depths of the ocean, are ſaid to chuſe the winter months; but, in general, thoſe with which we are acquainted, chuſe the hotteſt months in ſummer, and prefer ſuch water as is ſomewhat tepefied by the beams of the ſun. They then leave the deepeſt parts of the ocean, which are the coldeſt, and ſhoal round the coaſts, or ſwim up the freſh-water rivers, which are warm as they are comparatively ſhallow. When they have depoſited their burthens, they then return to their old ſtations, and leave their naſcent progeny to ſhift for themſelves.

The ſpawn continues in its egg-ſtate in ſome fiſh longer than in others, and this in proportion to the animal's ſize. In the ſalmon, for inſtance, the young animal continues in the egg from the beginning of December till the beginning of April; the carp continues in the egg not above three weeks; the little gold-fiſh from China is produced ſtill quicker. Theſe all, when excluded, at firſt eſcape by their minuteneſs and agility. They riſe, ſink, and turn much readier than grown

fiſh; and they can eſcape into very ſhallow waters when purſued. But, with all their advantages, ſcarce one in a thouſand ſurvives the numerous perils of its youth. The very male and female that have given them birth, are equally dangerous and formidable with the reſt, forgetting all relation at their departure.

Such is the general picture of theſe heedleſs and hungry creatures: but there are ſome in this claſs, living in the waters, that are poſſeſſed of finer organs and higher ſenſations; that have all the tenderneſs of birds or quadrupedes for their young; that nurſe them with conſtant care, and protect them from every injury. Of this claſs are the *Cetaceous* tribe, or the fiſhes of the whale-kind. There are others, though not capable of nurſing their young, yet that bring them alive into the world, and defend them with courage and activity. Theſe are the *Cartilaginous* kinds, or thoſe who have griſtles inſtead of bones. But the fierce unmindful tribe we have been deſcribing, that leave their ſpawn without any protection, are called the *Spinous* or bony kinds, from their bones reſembling the ſharpneſs of thorns.

Thus there are three grand diviſions in the fiſh kind: the *cetaceous*, the *cartilaginous*, and the *ſpinous*; all differing from each other in

their conformation, their appetites, in their bringing forth, and in the education of their young. Theſe three great diſtinctions are not the capricious differences formed by a maker of ſyſtems, but are ſtrongly and firmly marked in nature. Theſe are the diſtinctions of Ariſtotle; and they have been adopted by mankind ever ſince his time. It will be neceſſary, therefore, to give the hiſtory of each of theſe in particular; and then to range under each head, thoſe fiſhes whoſe hiſtory is the moſt remarkable; or, more properly ſpeaking, thoſe of which we have any hiſtory. For we ſhall find, when we come to any of the ſpecies in particular, how little can be ſaid of their habits, their ſtations, or method of propagation.'

Much, indeed, can be ſaid of them, if conſidered relatively to man; and large books have been written of the manner of taking fiſh; or of dreſſing them. Apicius is noted for having firſt taught mankind to ſuffocate fiſh in Carthaginian pickle; and Quin for giving a ſauce to the Johndory: Mrs. Glaſs is famous for her eel pie, and Mr. Tull for his invention of ſpaying carp to give it a finer flavour. In this manner our cooks handle the ſubject. On the other hand, our phyſicians aſſure us that the fleſh of fiſhes yields little nouriſhment, and ſoon cor-

rupts; that it abounds in a groſs ſort of oil and water, and hath but few volatile particles, which renders it leſs fit to be converted into the ſubſtance of our bodies. They are cold and moiſt, and muſt needs, ſay they, produce juices of the ſame kind, and conſequently are improper to ſtrengthen the body. In this diverſity of opinion, it is the wiſeſt way to eat our fiſh in the ordinary manner, and pay no great attention to cooks or doctors.

I cannot conclude this chapter without putting a queſtion to the learned which, I confeſs, I am not able to reſolve. How comes it that fiſh which are bred in a ſalt element have yet no ſalt to the taſte, or that is capable of being extracted from it?

## CHAP. II.

### Of Cetaceous Fiſhes in General.

AS on land there are ſome orders of animals that ſeem formed to command the reſt, with greater powers and more various inſtincts, ſo in the ocean there are fiſhes which ſeem formed upon a nobler plan than others, and that, to their fiſhy form, join the appetites and the conformation of quadrupedes. Theſe all are of the *cetaceous* kind; and ſo much raiſed above their fellows of the deep, in their appetites and inſtincts, that almoſt all our modern naturaliſts have fairly excluded them from the finny tribes, and will have them called, not fiſhes, but, great beaſts of the ocean. With them it would be as improper to ſay men go to Greenland fiſhing for whale, as it would be to ſay that a ſportſman goes to Blackwall a fowling for mackarel.

Yet, notwithſtanding philoſophers, mankind will always have their own way of talking; and for my own part I think them here in the right. A different formation of the lungs, ſtomach and inteſtines, a different manner of breathing or propagating, are not ſufficient to counterbalance the great obvious analogy which

theſe animals bear to the whole finny tribe. They are ſhaped as other fiſhes; they ſwim with fins; they are entirely naked, without hair; they live in the water, though they come up to breathe; they are only ſeen in the depths of the ocean, and never come upon ſhore but when forced thither. Theſe ſure are ſufficient to plead in favour of the general denomination, and acquit mankind of error in ranking them with their lower companions of the deep.

But ſtill they are as many degrees raiſed above other fiſhes in their nature, as they are in general in their ſize. This tribe is compoſed of the Whale and its varieties, of the Cachalot, the Dolphin, the Grampus, and the Porpeſs. All theſe reſemble quadrupedes in their internal ſtructure, and in ſome of their appetites and affections. Like quadrupedes, they have lungs, a midriff, a ſtomach, inteſtines, liver, ſpleen, bladder, and parts of generation; their heart alſo reſembles that of quadrupedes, with its partitions cloſed up as in them, and driving red and warm blood in circulation through the body. In ſhort, every internal part bears a moſt ſtriking ſimilitude; and to keep theſe parts warm, the whole kind are alſo covered between the ſkin and the muſcles with a thick coat of fat or blubber, which, like the bacon-fat of an hog,

keeps out the cold, renders their muſcles glib and pliant, and probably makes them lighter in ſwimming.

As theſe animals breathe the air, it is obvious that they cannot bear to be any long time under water. They are conſtrained, therefore, every two or three minutes, to come up to the ſurface to take breath, as well as to ſpout out through their noſtril, for they have but one, that water which they ſucked in while gaping for their prey. This conduit, by which they breathe, and alſo throw out the water, is placed in the head, a little before the brain. Though externally the hole is but ſingle, it is internally divided by a bony partition, which is cloſed by a ſphincter muſcle on the inſide, that, like the mouth of a purſe, ſhuts it up at the pleaſure of the animal. There is alſo another muſcle or valve, which prevents the water from going down the gullet. When therefore the animal takes in a certain quantity of water, which is neceſſary to be diſcharged and ſeparated from its food, it ſhuts the mouth, cloſes the valve of the ſtomach, opens the ſphincter that kept the noſtril cloſed, and then breathing ſtrongly from the lungs, puſhes the water out by the effort, as we ſee it riſe by the preſſure of air in a fire-engine.

The ſenſes of theſe animals ſeem alſo ſuperior to thoſe of other fiſhes. The eyes of other fiſhes, we have obſerved, are covered only with that tranſparent ſkin that covers the reſt of the head; but in all the cetaceous kinds, it is covered by eye-lids, as in man. This, no doubt, keeps that organ in a more perfect ſtate, by giving it intervals of relaxation, in which all viſion is ſuſpended. The other fiſhes, that are for ever ſtaring, muſt ſee, if for no other reaſon, more feebly, as their organs of ſight are always exerted.

As for hearing, theſe alſo are furniſhed with the internal inſtruments of the ear, although the external orifice no where appears. It is moſt probable that this orifice may open by ſome canal, reſembling the Euſtachian tube, into the mouth; but this has not as yet been diſcovered.

Yet Nature ſure has not thus formed a complete apparatus for hearing, and denied the animal the uſe of it when formed. It is moſt likely that all animals of the cetaceous kind can hear, as they certainly utter ſounds, and bellow to each other. This vocal power would be as needleſs to animals naturally deaf, as glaſſes to a man that was blind.

But it is in the circumſtances in which they continue their kind, that theſe animals ſhew an

eminent ſuperiority. Other fiſh depoſit their ſpawn, and leave the ſucceſs to accident: theſe never produce above one young, or two at the moſt; and this the female ſuckles entirely in the manner of quadrupedes, her breaſts being placed, as in the human kind, above the navel. We have read many fabulous accounts of the nurſing of the demigods of antiquity, of their feeding on the marrow of lions, and their being ſuckled by wolves; one might imagine a ſtill more heroic ſyſtem of nutrition, if we ſuppoſed that the young hero was ſuckled and grew ſtrong upon the breaſt-milk of a ſhe-whale.

The whale or the grampus are terrible at any time; but are fierce and deſperate in the defence of their young. In Waller's beautiful poem of the Summer Iſlands, we have a ſtory, founded upon fact, which ſhews the maternal tenderneſs of theſe animals for their offspring. A whale and her cub had got into an arm of the ſea, where, by the deſertion of the tide, they were encloſed on every ſide. The people from ſhore ſoon ſaw their ſituation, and drove down upon them in boats, with ſuch weapons as the urgent occaſion offered. The two animals were ſoon wounded in ſeveral places, and the whole ſea round was tinctured with their blood. The whales made ſeveral attempts to eſcape; and at laſt the old one,

by its ſuperior ſtrength, forced over the ſhallow, into the depths of the ocean. But though in ſafety herſelf, ſhe could not bear the danger that awaited her young one; ſhe therefore ruſhed in once more where the ſmaller animal was impriſoned, and reſolved, when ſhe could not protect, at leaſt to ſhare his danger.—The ſtory ends with poetical juſtice; for the tide coming in, brought off both in ſafety from their enemies, though not without ſuſtaining an infinite number of wounds in every part.

As to the reſt, the diſtinctive marks of this tribe are, that the number of their fins never exceeds three; namely, two pectoral fins, and one back fin; but in ſome ſorts the laſt is wanting. Theſe fins differ very much from thoſe of other fiſhes, which are formed of ſtraight ſpines: the fins of the cetaceous tribe are made up of bones and muſcles; and the ſkeleton of one of their fins, very much reſembles the ſkeleton of a man's hand. Their tails alſo are different from thoſe of all other fiſh: they are placed ſo as to lie flat on the ſurface of the water; while the other kinds have them, as we every day ſee, upright or edgeways. This flat poſition of the tail in cetaceous animals, enables them to force themſelves ſuddenly to the ſurface of the water to breathe, which they are continually conſtrained to do.

Of theſe enormous animals, ſome are without teeth, and properly called whales; others have the teeth only in the lower jaw, and are called, by the French, cachalots: the narwhal has teeth only in the upper jaw: the dolphin's teeth, as well as thoſe of the porpeſs and grampus, are both above and below. Theſe are the marks that ſerve to diſtinguiſh the kinds of this enormous tribe from each other; and theſe ſhall ſerve to guide us, in giving their hiſtory.

CHAP.

## CHAP. III.

### Of the Whale, properly ſo called, and its Varieties.

IF we compare land animals, in reſpect to magnitude, with thoſe of the deep, they will appear contemptible in the competition. It is probable, indeed, that quadrupedes once exiſted much larger than we find them at preſent. From the ſkeletons of ſome that have been dug up at different times, it is evident, that there muſt have been terreſtrial animals twice as large as the elephant; but creatures of ſuch an immenſe bulk required a proportionable extent of ground for ſubſiſtence, and, by being rivals with men for large territory, they muſt have been deſtroyed in the conteſt.

But it is not only upon land that man has exerted his power of deſtroying the larger tribes of animated nature, he has extended his efforts even into the midſt of the ocean, and has cut off numbers of thoſe enormous animals that had perhaps exiſted for ages. We now no longer hear of whales two hundred, and two hundred and fifty, feet long, which we are certain were often ſeen about two centuries ago. They have all

been deſtroyed by the ſkill of mankind, and the ſpecies is now dwindled into a race of diminutive animals, from thirty to about eighty feet long.

The northern ſeas were once the region to which the greateſt of theſe animals reſorted; but ſo great has been the ſlaughter of whales for more than two ages, that they begin to grow thinner every day; and thoſe that are found there, ſeem, from their ſize, not come to their full dimenſions. The greateſt whales reſort to places where they have the leaſt diſturbance; to thoſe ſeas that are on the oppoſite ſide of the globe, near the ſouth pole. In that part of the world, there are ſtill to be ſeen whales that are above an hundred and ſixty feet long; and perhaps even longer might be found in thoſe latitudes near the ſouth pole, to which we have not as yet ventured.

Taking the whale, however, at the ordinary ſize of eighty feet long and twenty feet high, what an enormous animated maſs muſt it appear to the ſpectator! With what amazement muſt it ſtrike him, to behold ſo great a creature gambolling in the deep, with the eaſe and agility of the ſmalleſt animal, and making its way with incredible ſwiftneſs! This is a ſight which is very common to thoſe who frequent the northern or

ſouthern ocean. Yet though this be wonderful, perhaps ſtill greater wonders are concealed in the deep, which we have not had opportunities of exploring. Theſe large animals are obliged to ſhew themſelves in order to take breath; but who knows the ſize of thoſe that are fitted to remain for ever under water; and that have been encreaſing in magnitude for centuries? To believe all that has been ſaid of the ſea-ſerpent, or the Kraken, would be credulity; to reject the poſſibility of their exiſtence, would be preſumption.

The Whale is the largeſt animal of which we have any certain information; and the various purpoſes to which, when taken, its different parts are converted, have brought us tolerably acquainted with its hiſtory. Of the whale, properly ſo called, there are no leſs than ſeven different kinds; all diſtinguiſhed from each other by their external figure, or internal conformation. The Great Greenland Whale, without a back-fin, and black on the back; the Iceland Whale, without a back-fin, and whitiſh on the back; the New England Whale, with a hump on the back; the Whale with ſix humps on the back; the Fin-fiſh, with a fin on the back near the tail; the Pike-headed Whale, and the Round-lipped Whale. All theſe differ

from each other in figure, as their names obviouſly imply. They differ alſo ſomewhat in their manner of living; the fin-fiſh having a larger ſwallow than the reſt, being more active, ſlender and fierce, and living chiefly upon herrings. However, they are none of them very voracious; and, if compared to the Cachalot, that enormous tyrant of the deep, they appear harmleſs and gentle. The hiſtory of the reſt, therefore, may be comprized under that of the Great Common Greenland Whale, with which we are beſt acquainted.

The Great Greenland Whale is the fiſh for taking which there are ſuch preparations made in different parts of Europe. It is a large heavy animal, and the head alone makes a third of its bulk. It is uſually found from ſixty to ſeventy feet long. The fins on each ſide are from five to eight feet, compoſed of bones and muſcles, and ſufficiently ſtrong to give the great maſs of body which they move, ſpeed and activity. The tail, which lies flat on the water, is about twenty-four feet broad; and, when the fiſh lies on one ſide, its blow is tremendous. The ſkin is ſmooth and black, and, in ſome places, marbled with white and yellow; which, running over the ſurface, has a very beautiful effect. This marbling is particularly obſervable in the fins and the tail. In

the figures which are thus drawn by Nature, fancy often forms the pictures of trees, landſcapes and houſes. In the tail of one that was thus marbled, Ray tells us that the number 122 was figured very evenly and exact, as if done with a pencil.

The whale makes uſe only of the tail to advance itſelf forward in the water. This ſerves as a great oar to puſh its maſs along; and it is ſurprizing to ſee with what force and celerity its enormous bulk cuts through the ocean. The fins are only made uſe of for turning in the water, and giving a direction to the velocity impreſſed by the tail. The female alſo makes uſe of them, when purſued, to bear off her young, clapping them on her back, and ſupporting them by the fins on each ſide from falling.

The outward or ſcarf ſkin of the whale is no thicker than parchment; but this removed, the real ſkin appears, of about an inch thick, and covering the fat or blubber that lies beneath: this is from eight to twelve inches in thickneſs; and is, when the fiſh is in health, of a beautiful yellow. The muſcles lie beneath; and theſe, like the fleſh of quadrupedes, are very red and tough.

The cleft of the mouth is above twenty feet

long, which is near one third of the animal's whole length; and the upper jaw is furniſhed with barbs, that lie, like the pipes of an organ, the greateſt in the middle, and the ſmalleſt to the ſides. Theſe compoſe the whale-bone; the longeſt ſpars of which are found to be not leſs than eighteen feet: the ſhorteſt, being of no value, are thrown away. The tongue is almoſt immovably fixed to the lower jaw, ſeeming one great lump of fat; and, in fact, it fills ſeveral hogſheads with blubber. The eyes are not larger than thoſe of an ox; and when the chryſtaline humour is dried, it does not appear larger than a pea. They are placed towards the back of the head, being the moſt convenient ſituation for enabling them to ſee both before and behind; as alſo to ſee over them, where their food is principally found. They are guarded by eye-lids and eye-laſhes, as in quadrupedes; and they ſeem to be very ſharp-ſighted.

Nor is their ſenſe of hearing in leſs perfection; for they are warned, at great diſtances, of any danger preparing againſt them. It would ſeem as if Nature had deſignedly given them theſe advantages, as they multiply little, in order to continue their kind. It is true indeed, that the external organ of hearing is not per-

ceptible, for this might only embarraſs them in their natural element; but as ſoon as the thin ſcarf ſkin abovementioned is removed, a black ſpot is diſcovered behind the eye, and under that is the auditory canal, that leads to a regular apparatus for hearing. In ſhort, the animal hears the ſmalleſt ſounds at very great diſtances, and at all times, except when it is ſpouting water; which is the time that the fiſhers approach to ſtrike it.

Theſe ſpout-holes or noſtrils, in all the cetaceous tribe, have been already deſcribed: in this whale they are two; one on each ſide the head before the eyes, and crooked, ſomewhat like the holes on the belly of a violin. From theſe holes this animal blows the water very fiercely, and with ſuch a noiſe that it roars like a hollow wind, and may be heard at three miles diſtance. When wounded, it then blows more fiercely than ever, ſo that it ſounds like the roaring of the ſea in a great ſtorm.

We have already obſerved, that the ſubſtance called whalebone, is taken from the upper jaw of the animal, and is very different from the real bones of the whale. The real bones are hard, like thoſe of great land animals, are very porous, and filled with marrow. Two great ſtrong bones ſuſtain the under lip, lying againſt

each other in the ſhape of an half-moon: ſome of theſe are twenty feet long; they are ſeen in ſeveral gardens ſet up againſt each other, and are uſually miſtaken for the ribs of this animal.

Such is the general conformation and figure of this great inhabitant of the deep, the preciſe anatomy of which has not been yet aſcertained. In thoſe places where they are caught in greateſt abundance, the ſailors are not very curious as to the ſtructure of the viſcera; and few anatomiſts care to undertake a taſk, where the operator, inſtead of ſeparating with a lancet, muſt cut his way with an ax. It is as yet doubted, therefore, whether the whale, that in moſt points internally reſembles a quadrupede, may not have one great bowel fitted entirely for the reception of air, to ſupply it, when conſtrained to keep longer than uſual at the bottom. The ſailors univerſally affirm that it has; and philoſophers have nothing but the analogy of its parts to oppoſe to their general aſſertions.

As theſe animals reſemble quadrupedes in conformation, ſo they bear a ſtrong reſemblance in ſome of their appetites and manners. The female joins with the male, as is aſſerted, *more humano*, and once in two years feels the acceſſes of deſire.

Their fidelity to each other exceeds whatever we are told of even the conſtancy of birds. Some fiſhers, as Anderſon informs us, having ſtruck one of two whales, a male and a female, that were in company together, the wounded fiſh made a long and terrible reſiſtance: it ſtruck down a boat with three men in it, with a ſingle blow of the tail, by which all went to the bottom. The other ſtill attended its companion, and lent it every aſſiſtance; till, at laſt, the fiſh that was ſtruck, ſunk under the number of its wounds; while its faithful aſſociate, diſdaining to ſurvive the loſs, with great bellowing, ſtretched itſelf upon the dead fiſh, and ſhared his fate.

The whale goes with young nine or ten months, and is then fatter than uſual, particularly when near the time of bringing forth. It is ſaid that the embryo, when firſt perceptible, is about ſeventeen inches long, and white; but the cub, when excluded, is black, and about ten feet long. She generally produces one young one, and never above two. When ſhe ſuckles her young, ſhe throws herſelf on one ſide on the ſurface of the ſea, and the young one attaches itſelf to the tate. The breaſts are two; generally hid within the belly; but ſhe

can produce them at pleaſure, ſo as to ſtand forward a foot and an half, or two feet; and the tates are like thoſe of a cow. In ſome, the breaſts are white; in others, ſpeckled; in all, filled with a large quantity of milk, reſembling that of land animals.

Nothing can exceed the tenderneſs of the female for her offspring; ſhe carries it with her wherever ſhe goes, and, when hardeſt purſued, keeps it ſupported between her fins. Even when wounded, ſhe ſtill claſps her young one; and when ſhe plunges to avoid danger, takes it to the bottom; but riſes ſooner than uſual, to give it breath again.

The young ones continue at the breaſt for a year; during which time, they are called by the ſailors, *ſhort-heads*. They are then extremely fat, and yield above fifty barrels of blubber. The mother, at the ſame time, is equally lean and emaciated. At the age of two years they are called *ſtunts*, as they do not thrive much immediately after quitting the breaſt: they then yield ſcarce above twenty, or twenty-four, barrels of blubber: from that time forward they are called *ſkull-fiſh*, and their age is wholly unknown.

Every ſpecies of whale propagates only with thoſe of its own kind, and does not at all min-

gle with the reſt: however, they are generally ſeen in ſhoals, of different kinds together, and make their migrations in large companies, from one ocean to another. They are a gregarious animal, which implies their want of mutual defence againſt the invaſions of ſmaller, but more powerful, fiſhes. It ſeems aſtoniſhing, therefore, how a ſhoal of theſe enormous animals find ſubſiſtence together, when it would ſeem that the ſupplying even one with food would require greater plenty than the ocean could furniſh. To encreaſe our wonder, we not only ſee them herding together, but uſually find them fatter than any other animals of whatſoever element. We likewiſe know that they cannot ſwallow large fiſhes, as their throat is ſo narrow, that an animal larger than an herring could not enter. How then do they ſubſiſt and grow ſo fat? A ſmall inſect which is ſeen floating in thoſe ſeas, and which Linnæus terms the Meduſa, is ſufficient for this ſupply. Theſe inſects are black, and of the ſize of a ſmall bean, and are ſometimes ſeen floating in cluſters on the ſurface of the water. They are of a round form, like ſnails in a box, but they have wings, which are ſo tender that it is ſcarce poſſible to touch them without breaking. Theſe ſerve rather for ſwimming than flying; and the little

animal is called by the Icelanders, the Walfiſchoas, which ſignifies the whale's provender. They have the taſte of raw muſcles, and have the ſmell of burnt ſugar. Theſe are the food of the whale, which it is ſeen to draw up in great numbers with its huge jaws, and to bruiſe between its barbs, which are always found with ſeveral of theſe ſticking among them.

This is the ſimple food of the great Greenland whale; it purſues no other animal, leads an inoffenſive life in its element, and is harmleſs in proportion to its ſtrength to do miſchief. There ſeems to be an analogy between its manners and thoſe of the elephant. They are both the ſtrongeſt and the largeſt animals in their reſpective elements; neither offer injury, but are terrible when provoked to reſentment. The fin-fiſh indeed, in ſome meaſure, differs from the great whale in this particular, as it ſubſiſts chiefly upon herrings, great ſhoals of which it is often ſeen driving before it. Yet even the ſwallow of this fiſh is not very large, if compared to the cachalot tribe; and its ravages are but ſports in compariſon. The ſtomach and inteſtines of all theſe animals, when opened, ſeldom have any thing in them, except a ſoft unctuous ſubſtance, of a browniſh colour; and their excrements are of a ſhining red.

As the whale is an inoffenſive animal, it is not to be wondered that it has many enemies, willing to take advantage of its diſpoſition, and inaptitude for combat. There is a ſmall animal, of the ſhell-fiſh kind, called the Whale-louſe, that ſticks to its body, as we ſee ſhells ſticking to the foul bottom of a ſhip. This inſinuates itſelf chiefly under the fins; and whatever efforts the great animal makes, it ſtill keeps its hold, and lives upon the fat, which it is provided with inſtruments to arrive at.

The ſword fiſh, however, is the whale's moſt terrible enemy. "At the ſight of this "little animal," ſays Anderſon, "the whale "ſeems agitated in an extraordinary manner; "leaping from the water as if with affright: "wherever it appears, the whale perceives it "at a diſtance, and flies from it in the op-"poſite direction. I have been myſelf," con-"tinues he, "a ſpectator of their terrible "encounter. The whale has no inſtrument "of defence except the tail; with that it en-"deavours to ſtrike the enemy; and a ſingle "blow taking place, would effectually deſtroy "its adverſary: but the ſword-fiſh is as active as "the other is ſtrong, and eaſily avoids the "ſtroke; then bounding into the air, it falls "upon its great ſubjacent enemy, and endea-

"vours not to pierce with its pointed beak,
"but to cut with its toothed edges. The ſea
"all about is ſeen dyed with blood, proceeding
"from the wounds of the whale; while the enor-
"mous animal vainly endeavours to reach its
"invader, and ſtrikes with its tail againſt the
"ſurface of the water, making a report at each
"blow louder than the noiſe of a cannon."

There is ſtill another and more powerful enemy called, by the fiſhermen of New England, the Killer. This is itſelf a cetaceous animal, armed with ſtrong and powerful teeth. A number of theſe are ſaid to ſurround a whale, in the ſame manner as dogs get round a bull. Some attack it with their teeth behind; others attempt it before; until, at laſt, the great animal is torn down, and its tongue is ſaid to be the only part they devour when they have made it their prey. They are ſaid to be of ſuch great ſtrength, that one of them alone was known to ſtop a dead whale that ſeveral boats were towing along, and drag it from among them to the bottom.

But of all the enemies of theſe enormous fiſhes, man is the greateſt: he alone deſtroys more in a year than the reſt in an age, and actually has thinned their numbers in that part of the world where they are chiefly ſought. The great reſort of theſe animals, was found to be

on the inhoſpitable ſhores of Spitzbergen; where the diſtance of the voyage, the coldneſs of the climate, the terrors of the icy ſea, and, ſtill more, their own formidable bulk, might have been expected to protect them from human injury. But all theſe were but ſlight barriers againſt man's arts, his courage, and his neceſſities. The European ſhips, ſoon after the improvement of navigation, found the way into thoſe ſeas; and as early as the beginning of the fourteenth century, the Biſcayneers were in poſſeſſion of a very conſiderable trade to the coaſts of Greenland. The Dutch and the Engliſh followed them thither, and ſoon took that branch of commerce out of their hands. The Engliſh commenced the buſineſs about the beginning of the ſeventeenth century; and the town of Hull had the honour of firſt attempting that profitable branch of trade. But, at preſent, it ſeems upon the decline, as the quantity of fiſh are ſo greatly reduced, by the conſtant capture for ſuch a vaſt length of time. It is now ſaid, that the fiſhers, from a defect of whales, apply themſelves to the ſeal-fiſhery; yet, as theſe animals are extremely timorous, they will ſoon be induced to quit thoſe ſhores, where they meet ſuch frequent diſturbance and danger. The poor natives of Greenland themſelves, who uſed to feed upon

the whale, are diminiſhing, in proportion as their ſuſtenance is removed; and, it is probable, that the revolution of a few years will ſee that extenſive coaſt totally deſerted by its inhabitants, as it is already nearly deſerted by the whales.

The art of taking whales, like moſt others, is much improved by time, and differs in many reſpects from that practiſed by the Biſcayneers, when they firſt frequented the icy ſea. But as the deſcription of their methods is the leaſt complicated, and conſequently the eaſieſt underſtood, it will be beſt ſuited to our purpoſe.

For this navigation, the Biſcayneers, in favourable ſeaſons, fitted out thirty ſhips, of two hundred and fifty tons each, with fifty choice men a-piece, and a few boys. Theſe were ſtored with ſix month's proviſion; and each ſhip had its boats, which were to be ſerviceable when come to the place of duty. When arrived at the part where the whales are expected to paſs to the ſouthward, they always keep their ſails ſet, and a ſailor is placed at the maſt head, to give information when he ſpies a whale. As ſoon as he diſcovers one, the whole crew are inſtantly in employment: they fit out their boats, and row away to where the whale was ſeen. The harpooner, who is to ſtrike the fiſh, ſtands at the prow of the boat, with an harpoon

or javelin in his hand, five or ſix feet long, pointed with ſteel like the barb of an arrow, of a triangular ſhape. As this perſon's place is that of the greateſt dexterity, ſo alſo it is of the greateſt danger: the whale ſometimes overturns the boat with a blow of its tail, and ſometimes drives againſt it with fury. In general, however, the animal ſeems to ſleep on the ſurface of the water; while the boat approaching, the harpooner ſtands aloft, and, with his harpoon tied to a cord of ſeveral hundred fathom length, darts it into the animal, and then rows as faſt as poſſible away. It is for ſome time before the whale ſeems to feel the blow; the inſtrument has uſually pierced no deeper than the fat, and that being inſenſible, the animal continues for a while motionleſs; but ſoon rouzed from its ſeeming lethargy, as the ſhaft continues to pierce deeper and deeper into the muſcular fleſh, it flies off with amazing rapidity. In the mean time, the harpoon ſticks in its ſide; while the rope, which is coiled up in the boat, and runs upon a ſwivel, lengthens as the whale recedes, but ſtill ſhews the part of the deep to which it has retreated. The cord is coiled up with great care; for ſuch is the rapidity with which it runs off, that if it was but the leaſt checked, as it yields with the animal's retreat,

it would infallibly overſet the boat, and the crew would go to the bottom. It ſometimes happens alſo, that the rapidity with which it runs over the ſwivel at the edge of the boat, heats it, and it would infallibly take fire, did not a man ſtand continually with a wet mop in his hand, to cool the ſwivel as the cord runs. The whale having dived to a conſiderable depth, remains at the bottom, ſometimes for near half an hour, with the harpoon in its body, and then riſes to take breath, expecting the danger over: but the inſtant it appears, they are all with their boats ready to receive it, and fling their harpoons into its body: the animal again dives and again riſes, while they repeat their blows. The ſhip follows in full ſail, like all the reſt, never loſing ſight of the boats, and ready to lend them aſſiſtance; the whole ocean ſeems dyed in blood. Thus they renew their attacks, till the whale begins to be quite enfeebled and ſpent, when they plunge their longer ſpears into various parts of its body, and the enormous animal expires. When it is dead, to prevent it from ſinking, they tie it with a ſtrong iron chain to the ſide of the boat, and either cut it up in pieces, and carry it home in that manner, or extract the oil from the blubber on ſhip-board.

Such is the manner in which theſe fiſh were taken in the beginning; but ſucceeding arts have improved the method, and the harpoon is now thrown by; a machine being uſed which inflicts a deeper wound, and ſtrikes the animal with much greater certainty: there are better methods for extracting the oil, and properer machines for cutting the animal up, than were uſed in the early fiſheries. But as an account of this belongs to the hiſtory of art, and not of nature, we muſt be contented, with obſerving, that ſeveral parts of this animal, and all but the inteſtines and the bones, are turned to very good account; not only the oil, but the greaves from which it is ſeparated. The barbs alſo were an article of great profit; but have ſunk in their price ſince women no longer uſe them to ſwell out their petticoats with whale-bone. The fleſh of this animal is alſo a dainty to ſome nations; and even the French ſea-men are now and then found to dreſs and uſe it as their ordinary diet at ſea. It is ſaid, by the Engliſh and Dutch ſailors, to be hard and ill-taſted; but the French aſſert the contrary; and the ſavages of Greenland, as well as thoſe near the ſouth pole, are fond of it to diſtraction. They eat the fleſh, and drink the oil, which is a firſt-rate delicacy. The find-

ing a dead whale is an adventure conſidered among the fortunate circumſtances of their wretched lives. They make their abode beſide it; and ſeldom remove till they have left nothing but the bones.

Jacobſon, whom we quoted before in the Hiſtory of Birds, where he deſcribes his countrymen of the iſland of Feroe as living a part of the year upon ſalted gulls, tells us alſo, that they are very fond of ſalted whale's fleſh. The fat of the head they ſeaſon with bay ſalt, and then hang it up to dry in the chimney. He thinks it taſtes as well as fat bacon; and the lean, which they boil, is, in his opinion, not inferior to beef. I fancy poor Jacobſon would make but an indifferent taſter at one of our city feaſts!

CHAP.

## CHAP. IV.

### Of the Narwhal.

FROM whales that entirely want teeth, we come to ſuch as have them in the upper jaw only; and in this claſs there is found but one, the Narwhal, or Sea-unicorn. This fiſh is not ſo large as the whale, not being above ſixty feet long. Its body is ſlenderer than that of the whale, and its fat not in ſo great abundance. But this great animal is ſufficiently diſtinguiſhed from all others of the deep by its tooth or teeth, which ſtand pointing directly forward from the upper jaw, and are from nine to fourteen feet long. In all the variety of weapons with which Nature has armed her various tribes, there is not one ſo large or ſo formidable as this. This terrible weapon is generally found ſingle; and ſome are of opinion that the animal is furniſhed but with one by nature; but there is at preſent the ſkull of a narwhal at the Stadthouſe at Amſterdam with two teeth; which plainly proves that in ſome animals, at leaſt, this inſtrument is double. It is even a doubt whether it may not be ſo in all; and that the narwhal's

wanting a tooth is only an accident which it has met with in the encounters it is obliged daily to be engaged in. Yet it muſt be owned of theſe that are taken only with one tooth, there ſeems no ſocket nor no remains of any other upon the oppoſite ſide of the jaw, but all is plain and even. However this be, the tooth, or, as ſome are pleaſed to call it, the horn of the narwhal is the moſt terrible of all natural inſtruments of deſtruction. It is as ſtraight as an arrow, about the thickneſs of the ſmall of a man's leg, wreathed in the manner we ſometimes ſee twiſted bars of iron; it tapers to a ſharp point; and is whiter, heavier, and harder than ivory. It is generally ſeen to ſpring from the left ſide of the head directly forward in a ſtraight line with the body; and its root enters into the ſocket above a foot and an half. In a ſkull to be ſeen at Hamburgh there are two teeth, which are each above ſeven feet long, and are eight inches in circumference. When the animal poſſeſſed of theſe formidable weapons is urged to employ them, it drives directly forward againſt the enemy with its teeth, that, like portended ſpears, pierce whatever ſtands before them.

The extreme length of theſe inſtruments have induced ſome to conſider them rather as

horns than teeth; but they in every reſpect reſemble the tuſks of the boar and the elephant. They grow, as in them, from ſockets in the upper jaw; they have the ſolidity of the hardeſt bone, and far ſurpaſs ivory in all its qualities. The ſame error has led others to ſuppoſe, that as among quadrupedes the female was often found without horns, ſo theſe inſtruments of defence were only to be found in the male; but this has been more than once refuted by actual experience; both ſexes are found armed in this manner; the horn is ſometimes found wreathed and ſometimes ſmooth; ſometimes a little bent and ſometimes ſtraight; but always ſtrong, deeply fixed, and ſharply pointed.

Yet, notwithſtanding all theſe appointments for combat, theſe long and pointed tuſks, amazing ſtrength, and unmatchable celerity, the narwhal is one of the moſt harmleſs and peaceful inhabitants of the ocean. It is ſeen conſtantly and inoffenſively ſporting among the other great monſters of the deep, no way attempting to injure them, but pleaſed in their company. The Greenlanders call the narwhal the fore-runner of the whale; for wherever it is ſeen, the whale is ſhortly after ſure to follow. This may ariſe as well from the natural paſſion for ſociety in theſe animals as from both living

upon the ſame food, which are the inſects deſcribed in the preceding chapter. Theſe powerful fiſhes make war upon no other living creature; and, though furniſhed with inſtruments to ſpread general deſtruction, are as innocent and as peaceful as a drove of oxen. Nay, ſo regardleſs are they of their own weapons, and ſo utterly unmindful to keep them in repair for engagement, that they are conſtantly ſeen covered over with weeds, ſlough, and all the filth of the ſea; they ſeem rather conſidered as an impediment than a defence.

The manners and appetites both of the narwhal and the great whale are entirely ſimilar; they both alike want teeth for chewing, and are obliged to live upon inſects; they both are peaceable and harmleſs, and always rather fly than ſeek the combat. The narwhal, however, has a much narrower gape than the great whale, and therefore does not want the uſe of barbs to keep in its food when once ſucked into the mouth. It is alſo much ſwifter, and would never be taken by the fiſherman but for thoſe very tuſks, which at firſt appear to be its principal defence. Theſe animals, as was ſaid, being fond of living together, are always ſeen in herds of ſeveral at a time; and whenever they are attacked, they crowd together in ſuch a manner, that they are

mutually embaraſſed by their tuſks. By theſe they are often locked together, and are prevented from ſinking to the bottom. It ſeldom happens, therefore, but the fiſhermen make ſure of one or two of the hindmoſt, which very well reward their trouble.

It is from the extraordinary circumſtance of the teeth, therefore, that this fiſh demands a diſtinct hiſtory; and ſuch has been the curioſity of mankind, and their deſire to procure them, that a century ago they were conſidered as the greateſt rarity in the world. At that time the art of catching whales was not known; and mankind ſaw few, except ſuch as were ſtranded on the coaſts by accident. The tooth of the narwhal, therefore, was aſcribed to a very different animal from that which really bore it. Among other foſſil ſubſtances they were ſometimes dug up; and the narwhal being utterly unknown, naturaliſts ſoon found a terreſtrial owner. They were thought to be the horns of unicorns, an animal deſcribed by Pliny as reſembling an horſe, and with one ſtraight horn darting forward from the middle of its forehead. Theſe teeth were, therefore, conſidered as a ſtrong teſtimony in favour of that hiſtorian's veracity, and were ſhewn among the moſt precious remains of antiquity. Even for ſome

time after the narwhal was known, the deceit was continued, as thoſe who were poſſeſſed of a tooth ſold it to great advantage. But at preſent they are too well known to deceive any, and are only ſhewn for what they really are; their curioſity encreaſing in proportion to their weight and their ſize.

CHAP.

## CHAP. V.

### Of the Cachalot and its Varieties.

THE Cachalot, which has generally gone under the name of the Spermaceti Whale, till Mr. Penant very properly made the diſtinction, by borrowing its name from the French, has ſeveral teeth in the under-jaw, but none in the upper. As there are no leſs than ſeven diſtinctions among whales, ſo alſo there are the ſame number of diſtinctions in the tribe we are deſcribing. The cachalot with two fins and a black back; the cachalot with two fins and a whitiſh back; that with a ſpout in the neck; that with the ſpout in the ſnout; that with three fins and ſharp pointed teeth; that with three fins and ſharp edged teeth; and laſtly, the cachalot with three fins and flatted teeth.

This tribe is not of ſuch enormous ſize as the whale, properly ſo called, not being above ſixty feet long and ſixteen feet high. In conſequence of their being more ſlender, they are much more active than the common whale; they remain a longer time at the bottom, and afford a ſmaller quantity of oil. As in the common whale the head was ſeen to make a third part of its bulk, ſo in this ſpecies the

head is ſo large as to make one half of the whole. The tongue of this animal is ſmall; but the throat is very formidable; and with very great eaſe it could ſwallow an ox. In the ſtomach of the whale ſcarce any thing is to be found; but in that of the cachalot there are loads of fiſh of different kinds; ſome whole, ſome half digeſted, ſome ſmall, and others eight or nine feet long. The cachalot is therefore as deſtructive among leſſer fiſhes as the whale is harmleſs; and can at one gulp ſwallow a ſhoal of fiſhes down its enormous gullet. Linnæus tells us that this fiſh purſues and terrifies the dolphins and porpoiſes ſo much, as often to drive them on ſhore.

But, how formidable ſoever this fiſh may be to its fellows of the deep, it is by far the moſt valuable, and the moſt ſought after by man, as it contains two very precious drugs, ſpermaceti and amber-greaſe. The uſe of theſe, either for the purpoſes of luxury or medicine, is ſo univerſal, that the capture of this animal, that alone ſupplies them, turns out to very great advantage, particularly ſince the art has been found out of converting all the oil of this animal, as well as the brain, into that ſubſtance called ſpermaceti.

This ſubſtance, as it is naturally formed, is

found in the head of the animal, and is no other than the brain. The outward ſkin of the head being taken off, a covering of fat offers about three inches thick; and under that, inſtead of a bony ſkull, the animal has only another thick ſkin, that ſerves for a covering and defence of the brain. The firſt cavity, or chamber, of the brain, is filled with that ſpermaceti which is ſuppoſed of the greateſt purity and higheſt value. From this cavity there is generally drawn about ſeven barrels of the cleareſt ſpermaceti, that thrown upon water coagulates like cheeſe. Below this there is another chamber juſt over the gullet, which is about ſeven feet high; and this alſo contains the drug, but of leſs value. It is diſtributed in this cavity like honey in a hive, in ſmall cells, ſeparated from each other by a membrane like the inner ſkin of an egg. In proportion as the oily ſubſtance is drawn away from this part it fills anew from every part of the body; and from this is generally obtained about nine barrels of oil. Beſides this, the ſpinal marrow, which is about as thick as a man's thigh, and reaches all along the back-bone to the tail, where it is not thicker than one's finger, affords no inconſiderable quantity.

This ſubſtance, which is uſed in the compo-

ſition of many medicines, rather to give them conſiſtence than efficacy, was at firſt ſold at a very high price, both from the many virtues aſcribed to it and the ſmall quantity that the cachalot was capable of ſupplying; at preſent, the price is greatly fallen; firſt, becauſe its efficacy in medicine is found to be very ſmall; and again, becauſe the whole oil of the fiſh is very eaſily convertible into ſpermaceti. This is performed by boiling it with a lea of pot-aſh, and hardening it in the manner of ſoap. Candles are now made of it, which are ſubſtituted for wax, and ſold much cheaper; ſo that we need not fear having our ſpermaceti adulterated in the manner ſome medical books caution us to beware of; for they carefully guard us againſt having our ſpermaceti adulterated with virgin's wax.

As to the amber-greaſe which is ſometimes found in this whale, it was long conſidered as a ſubſtance found floating on the ſurface of the ſea; but time, that reveals the ſecrets of the mercenary, has diſcovered that it chiefly belongs to this animal. The name, which has been improperly given to the former ſubſtance, ſeems more juſtly to belong to this; for the amber-greaſe is found in the place where the ſeminal veſſels are uſually ſituated in other

animals. It is found in a bag of three or four feet long, in round lumps, from one to twenty pounds weight, floating in a fluid rather thinner than oil, and of a yellowiſh colour. There are never ſeen more than four at a time in one of theſe bags; and that which weighed twenty pounds, and which was the largeſt ever ſeen, was found ſingle. Theſe balls of amber-greaſe are not found in all fiſhes of this kind, but chiefly in the oldeſt and ſtrongeſt. The uſes of this medicine for the purpoſes of luxury and as a perfume are well known; though upon ſome ſubjects ignorance is preferable to information.

CHAP.

## CHAP. VI.

### Of the Dolphin, the Grampus, and the Porpus, with their Varieties.

ALL theſe fiſh have teeth both in the upper and the lower jaw, and are much leſs than the whale. The Grampus, which is the largeſt, never exceeds twenty feet. It may alſo be diſtinguiſhed by the flatneſs of its head, which reſembles a boat turned upſide down. The porpus reſembles the grampus in moſt things except the ſnout, which is not above eight feet long; its ſnout alſo more reſembles that of an hog. The dolphin has a ſtrong reſemblance to the porpus, except that its ſnout is longer and more pointed. They have all fins on the back; they all have heads very large, like the reſt of of the whale-kind; and reſemble each other in their appetites, their mannners, and conformations; being equally voracious, active, and roving.

The great agility of theſe animals prevents their often being taken. They ſeldom remain a moment above water; ſometimes, indeed, their too eager purſuits expoſe them to danger; and a ſhoal of herrings often allures them out of

their depth. In ſuch a caſe, the hungry animal continues to flounder in the ſhallows till knocked on the head, or till the retiring tide ſeaſonably comes to its relief. But all this tribe, and the dolphin in particular, are not leſs ſwift than deſtructive. No fiſh could eſcape them, but from the aukward poſition of the mouth, which is placed in a manner under the head: yet, even with theſe diſadvantages, their depredations are ſo great, that they have been juſtly ſtiled the plunderers of the deep.

What could induce the ancients to a predilection in favour of theſe animals, particularly the dolphin, it is not eaſy to account for. Hiſtorians and philoſophers ſeem to have contended who ſhould invent the greateſt number of fables concerning them. The dolphin was celebrated in the earlieſt time for its fondneſs to the human race, and was diſtinguiſhed by the epithets of the boy-loving and philanthropiſt. Scarce an accident could happen at ſea but the dolphin offered himſelf to convey the unfortunate to ſhore. The muſician flung into the ſea by pirates, the boy taking an airing into the midſt of the ſea, and returning again in ſafety, were obliged to the dolphin for its ſervices. It is not eaſy, I ſay, to aſſign a cauſe why the ancients ſhould thus have invented ſo

many fables in their favour. The figure of theſe animals is far from prejudicing us in their intereſts; their extreme rapacity tends ſtill leſs to endear them: I know nothing that can reconcile them to man and excite his prejudices, except that when taken they ſometimes have a plaintiff moan, with which they continue to expreſs their pain till they expire. This, at firſt, might have excited human pity; and that might have produced affection. At preſent, theſe fiſhes are regarded even by the vulgar in a very different light; their appearance is far from being eſteemed a favourable omen by the ſea-men; and from their boundings, ſprings, and frolics in the water, experience has taught the mariners to prepare for a ſtorm.

But it is not to one circumſtance only that the ancients have confined their fabulous reports concerning theſe animals; as from their leaps out of their element, they aſſume a temporary curvature, which is by no means their natural figure in the water, the old painters and ſculptors have univerſally drawn them wrong. A dolphin is ſcarce ever exhibited by the ancients in a ſtraight ſhape, but curved, in the poſition which they ſometimes appear in when exerting their force; and the poets too have adopted the general error. Even Pliny, the beſt natu-

raliſt, has aſſerted, that they inſtantly die when taken out of the water; but Rondelet, on the contrary, aſſures us, that he has ſeen a dolphin carried alive from Montpellier to Lyons.

The moderns have more juſt notions of theſe animals; and have got over the many fables, which every day's experience contradicts. Indeed their numbers are ſo great, and, though ſhy, they are ſo often taken, that ſuch peculiarities, if they were poſſeſſed of any, would have been long ſince aſcertained. They are found, the porpeſs eſpecially, in ſuch vaſt numbers, in all parts of the ſea that ſurrounds this kingdom, that they are ſometimes noxious to ſeamen, when they ſail in ſmall veſſels. In ſome places they almoſt darken the water as they riſe to take breath, and particularly before bad weather are much agitated, ſwimming againſt the wind, and tumbling about with unuſual violence.

Whether theſe motions be the gambols of pleaſure, or the agitations of terror, is not well known. It is moſt probable that they dread thoſe ſeaſons of turbulence, when the leſſer fiſhes ſhrink to the bottom, and their prey no longer offers in ſufficient abundance. In times of fairer weather, they are ſeen herding together, and purſuing ſhoals of various fiſh

with great impetuoſity. Their method of hunting their game, if it may be ſo called, is to follow in a pack, and thus give each other mutual aſſiſtance. At that ſeaſon when the mackarel, the herring, the ſalmon, and other fiſh of paſſage, begin to make their appearance, the cetaceous tribes are ſeen fierce in the purſuit; urging their prey from one creek or bay to another, deterring them from the ſhallows, driving them towards each other's ambuſh, and uſing a greater variety of arts than hounds are ſeen to exert in purſuing the hare. However, the porpeſs not only ſeeks for prey near the ſurface, but often deſcends to the bottom in ſearch of ſand-eels and ſea-worms, which it roots out of the ſand with its noſe, in the manner hogs harrow up the fields for food. For this purpoſe, the noſe projects a little, is ſhorter and ſtronger than that of the dolphin; and the neck is furniſhed with very ſtrong muſcles, which enable it the readier to turn up the ſand.

But it ſometimes happens, that the impetuoſity, or the hunger, of theſe animals, in their uſual purſuits, urges them beyond the limits of ſafety. The fiſhermen, who extend their long nets for pilchards, on the coaſts of Cornwall, have ſometimes an unwelcome cap-

ture in one of theſe. Their feeble nets, which are calculated only for taking ſmaller prey, ſuffer an univerſal laceration, from the efforts of this ſtrong animal to eſcape; and if it be not knocked on the head, before it has had time to flounder, the nets are deſtroyed, and the fiſhery interrupted. There is nothing, therefore, they ſo much dread, as the entangling a porpeſs; and they do every thing to intimidate the animal from approaching.

Indeed, theſe creatures are ſo violent in the purſuit of their prey, that they ſometimes follow a ſhoal of ſmall fiſhes up a freſh-water river, from whence they find no ſmall difficulty to return. We have often ſeen them taken in the Thames at London, both above the bridges and below them. It is curious enough to obſerve with what activity they avoid their purſuers, and what little time they require to fetch breath above the water. The manner of killing them is for four or five boats to ſpread over the part of the river in which they are ſeen, and with fire-arms to ſhoot at them the inſtant they riſe above the water. The fiſh being thus for ſome time kept in agitation, requires to come to the ſurface at quicker intervals, and thus affords the markſmen more frequent opportunities.

When the porpeſs is taken, it becomes no

inconſiderable capture, as it yields a very large quantity of oil; and the lean of ſome, particularly if the animal be young, is ſaid to be as well taſted as veal. The inhabitants of Norway prepare from the eggs found in the body of this fiſh, a kind of caviar, which is ſaid to be very delicate ſauce, or good when even eaten with bread. There is a fiſhery for porpeſs along the weſtern iſles of Scotland during the ſummer ſeaſon, when they abound on that ſhore; and this branch of induſtry turns to good advantage.

As for the reſt, we are told, that theſe animals go with young ten months; that, like the whale, they ſeldom bring forth above one at a time, and that in the midſt of ſummer: that they live to a conſiderable age; though ſome ſay not above twenty-five or thirty years; and they ſleep with the ſnout above water. They ſeem to poſſeſs, in a degree proportioned to their bulk, the manners of whales; and the hiſtory of one ſpecies of cetaceous animals will, in a great meaſure, ſerve for all the reſt.

PART

# PART II.

## OF

## *CARTILAGINOUS FISHES.*

# CHAP. I.

## Of Cartilaginous Fiſhes in General.

WE have ſeen that fiſhes of the cetaceous kind bear a ſtrong reſemblance to quadrupedes in their conformation; thoſe of the cartilaginous kinds are one remove ſeparated from them: they form the ſhade that completes the imperceptible gradations of nature.

The firſt great diſtinction they exhibit is, in having cartilages or griſtles inſtead of bones. The cetaceous tribes have their bones entirely reſembling thoſe of quadrupedes, thick, white, and filled with marrow; thoſe of the ſpinous kind, on the contrary, have ſmall ſlender bones, with points reſembling thorns, and generally ſolid throughout. Fiſhes of the cartilaginous kinds have their bones always ſoft and yielding; and age, that hardens the bones of other animals, rather contributes ſtill more to ſoften theirs. The ſize of all fiſhes encreaſes with age; but from the pliancy of the bones in this tribe, they ſeem to have no bounds placed to their dimenſions: and it is ſuppoſed that they grow larger every day till they die.

They have other differences, more obviouſly diſcernible. We have obſerved, that the cetaceous tribes had lungs like quadrupedes, an heart with its partition in the ſame manner, and an apparatus for hearing; on the other hand we mentioned, that the ſpinous kinds had no organs of hearing, no lungs to breathe through, and no partition in the heart; but that their cold red blood was circulated by the means of the impulſe made upon their gills by the water. Cartilaginous fiſhes unite both theſe ſyſtems in their conformation: like the cetaceous tribes, they have organs of hearing, and lungs; like the ſpinous kinds, they have gills, and an heart without a partition. Thus poſſeſſed of a twofold power of breathing, ſometimes by means of their lungs, ſometimes by that of their gills, they ſeem to unite all the advantages of which their ſituation is capable, and drawing from both elements, every aid to their neceſſities or their enjoyments.

This double capacity of breathing in theſe animals, is one of the moſt remarkable features in the hiſtory of nature. The apertures by which they breathe, are ſomewhere placed about the head; either beneath, as in flat fiſh; on the ſides, as in ſharks; or on the top of the head, as in pipe-fiſh. To theſe apertures are the gills

affixed, but without any bone to open and ſhut them, as in ſpinous fiſhes; from which, by this mark, they may be eaſily diſtinguiſhed, though otherwiſe very much alike in appearance. From theſe are bending cylindrical ducts, that run to the lungs, and are ſuppoſed to convey the air, that gives the organs their proper play. The heart, however, has but one valve; ſo that their blood wants that double circulation which obtains in the cetaceous kinds; and the lungs ſeem to me rather as an internal aſſiſtant to the gills, than fitted for ſupplying the ſame offices as in quadrupedes, for they want the pulmonary vein and artery.

From this ſtructure, however, the animal is enabled to live a longer time out of water than thoſe whoſe gills are more ſimple. The cartilaginous ſhark, or ray, live ſome hours after they are taken; while the ſpinous herring or mackarel expire a few minutes after they are brought on ſhore. From hence this tribe ſeems poſſeſſed of powers that other fiſhes are wholly deprived of; they can remain continually under water, without ever taking breath; while they can venture their heads above the deep, and continue for hours out of their native element.

We obſerved, in a former chapter, that ſpinous fiſhes have not, or at leaſt appear not to

have, externally any inſtruments of generation. It is very different with thoſe of the cartilaginous kind, for the male always has theſe inſtruments double. The fiſh of this tribe are not unfrequently ſeen to copulate; and their manner is belly to belly, ſuch as may naturally be expected from animals whoſe parts of generation are placed forward. They in general chuſe colder ſeaſons and ſituations than other fiſh for propagating their kind; and many of them bring forth in the midſt of winter.

The ſame duplicity of character which marks their general conformation obtains alſo with regard to their manner of bringing forth. Some bring forth their young alive; and ſome bring forth eggs, which are afterwards brought to maturity. In all, however, the manner of geſtation is nearly the ſame; for upon diſſection, it is ever found, that the young, while in the body, continue in the egg till a very little time before they are excluded; theſe eggs they may properly be ſaid to hatch within their body; and as ſoon as their young quit the ſhell, they begin to quit the womb alſo. Unlike to quadrupedes, or the cetaceous tribes, that quit the egg ſtate a few days after their firſt conception, and continue in the womb ſeveral months after, theſe continue in the body of the female, in their egg

ſtate, for weeks together; and the eggs are found linked together by a membrane, from which, when the fætus gets free, it continues but a very ſhort time till it delivers itſelf from its confinement in the womb. The eggs themſelves conſiſt of a white and a yolk, and have a ſubſtance, inſtead of ſhell, that aptly may be compared to ſoftened horn. Theſe, as I obſerved, are ſometimes hatched in the womb, as in the ſhark and ray kinds; and they are ſometimes excluded, as in the ſturgeon, before the animal comes to its time of diſengaging. Thus we ſee that there ſeems very little difference between the viviparous and the oviparous kinds, in this claſs of fiſhes; the one hatch their eggs in the womb, and the young continue no long time there; the others exclude their eggs before hatching, and leave it to time and accident to bring their young to maturity.

Such are the peculiar marks of the cartilaginous claſs of fiſhes, of which there are many kinds. To give a diſtinct deſcription of every fiſh is as little my intention, as perhaps it is the wiſh of the reader; but the peculiarities of each kind deſerve notice, and the moſt ſtriking of theſe it would be unpardonable to omit.

Cartilaginous fiſh may be divided firſt into

thoſe of the ſhark kind, with a body growing leſs towards the tail, a rough ſkin, with the mouth placed far beneath the end of the noſe, five apertures on the ſides of the neck for breathing, and the upper part of the tail longer than the lower. This claſs chiefly comprehends the Great White Shark, the Balance Fiſh, the Hound Fiſh, the Monk Fiſh, the Dog Fiſh, the Baſking Shark, the Zygæna, the Tope, the Cat Fiſh, the Blue Shark, the Sea Fox, the Smooth Hound Fiſh, and the Porbeagle. Theſe are all of the ſame nature, and differ more in ſize, than in figure or conformation.

The next diviſion is that of flat fiſh; and theſe their broad, flat, thin ſhape is ſufficiently capable of diſtinguiſhing from all others of this kind. They may be eaſily diſtinguiſhed alſo from ſpinous flat fiſh, by the holes through which they breathe, which are uncovered by a bone; and which, in this kind, are five on each ſide. In this tribe we may place the Torpedo, the Skate, the Sharp-noſed Ray, the Rough Ray, the Thornback, and the Fire Flare.

The third diviſion is that of the ſlender ſnake-ſhaped kind: ſuch as the Lamprey, the Pride, and the Pipe Fiſh.

The fourth diviſion is of the Sturgeon and its variety, the Iſing-glaſs Fiſh.

The laſt diviſion may comprize fiſh of different figures and natures, that do not rank under the former diviſions. Theſe are the Sun Fiſh, the Tetrodon, the Lump Fiſh, the Sea Snail, the Chimæra and the Fiſhing Frog. Each of theſe has ſomewhat peculiar in its powers or its form, that deſerves to be remarked. The deſcription of the figures of theſe at leaſt may compenſate for our general ignorance of the reſt of their hiſtory.

CHAP.

## CHAP. II.

### Of Cartilaginous Fiſhes of the Shark Kind.

OF all the inhabitants of the deep, thoſe of the ſhark kind are the fierceſt and the moſt voracious. The ſmalleſt of this tribe is not leſs dreaded by greater fiſh, than many that to appearance ſeem more powerful; nor do any of them ſeem fearful of attacking animals far above their ſize: but the Great White Shark, which is the largeſt of the kind, joins to the moſt amazing rapidity, the ſtrongeſt appetites for miſchief: as he approaches nearly in ſize to the whale, he far ſurpaſſes him in ſtrength and celerity, in the formidable arrangement of his teeth, and his inſatiable deſire of plunder.

The white ſhark is ſometimes ſeen to rank even among whales for magnitude; and is found from twenty to thirty feet long. Some aſſert that they have ſeen them of four thouſand pound weight; and we are told particularly of one, that had a human corpſe in his belly. The head is large, and ſomewhat flatted; the ſnout long, and the eyes large. The mouth is enormouſly wide; as is the throat, and capable of ſwallowing a man with great eaſe. But its

furniture of teeth is ſtill more terrible: of theſe there are ſix rows, extremely hard, ſharp-pointed, and of a wedge-like figure. It is aſſerted that there are ſeventy-two in each jaw, which make one hundred and forty-four in the whole; yet others think that their number is uncertain; and that, in proportion as the animal grows older, theſe terrible inſtruments of deſtruction are found to encreaſe. With theſe the jaws both above and below appear planted all over; but the animal has a power of erecting or depreſſing them at pleaſure. When the ſhark is at reſt, they lie quite flat in his mouth; but when he prepares to ſeize his prey, he erects all this dreadful apparatus, by the help of a ſet of muſcles that join them to the jaw; and the animal he ſeizes, dies pierced with an hundred wounds in a moment.

Nor is this fiſh leſs terrible to behold as to the reſt of his form: his fins are larger, in proportion; he is furniſhed with great goggle eyes, that he turns with eaſe on every ſide, ſo as to ſee his prey behind him as well as before; and his whole aſpect is marked with a character of malignity: his ſkin alſo is rough, hard and prickly; being that ſubſtance which covers inſtrument caſes, called ſhagreen.

As the ſhark is thus formidable in his appearance, ſo is he alſo dreadful, from his courage and activity. No fiſh can ſwim ſo faſt as he; none ſo conſtantly employed in ſwimming, he outſtrips the ſwifteſt ſhips, plays round them, darts out before them, returns, ſeems to gaze at the paſſengers, and all the while does not ſeem to exhibit the ſmalleſt ſymptom of an effort to proceed. Such amazing powers, with ſuch great appetites for deſtruction, would quickly unpeople even the ocean, but providentially the ſhark's upper jaw projects ſo far above the lower, that he is obliged to turn on one ſide (not on his back, as is generally ſuppoſed) to ſeize his prey. As this takes ſome ſmall time to perform, the animal purſued ſeizes that opportunity to make its eſcape.

Still, however, the depredations he commits are frequent and formidable. The ſhark is the dread of ſailors in all hot climates; where, like a greedy robber, he attends the ſhips, in expectation of what may drop over board. A man who unfortunately falls into the ſea at ſuch a time, is ſure to periſh, without mercy. A ſailor that was bathing in the Mediterranean, near Antibes, in the year 1744, while he was ſwimming about fifty yards from the ſhip,

perceived a monſtrous fiſh making towards him, and ſurveying him on every ſide, as fiſh are often ſeen to look round a bait. The poor man, ſtruck with terror at its approach, cried out to his companions in the veſſel to take him on board. They accordingly threw him a rope with the utmoſt expedition, and were drawing him up by the ſhip's ſide, when the ſhark darted after him from the deep, and ſnapped off his leg.

Mr. Penant tells us, that the maſter of a Guinea-ſhip, finding a rage for ſuicide prevail among his ſlaves, from a notion the unhappy creatures had, that after death they ſhould be reſtored again to their families, friends and country; to convince them at leaſt that ſome diſgrace ſhould attend them here, he ordered one of their dead bodies to be tied by the heels to a rope, and ſo let down into the ſea; and though it was drawn up again with great ſwiftneſs, yet, in that ſhort ſpace, the ſharks had bit off all but the feet. Whether this ſtory is prior to an accident of the ſame kind, which happened at Belfaſt, in Ireland, about twenty years ago, I will not take upon me to determine; but certain it is, there are ſome circumſtances alike in both, though more terrible in that I am going to relate. A Guinea captain was,

by ſtreſs of weather, driven into the harbour of Belfaſt, with a lading of very ſickly ſlaves, who, in the manner above-mentioned, took every opportunity to throw themſelves over board when brought up upon deck, as is uſual, for the benefit of the freſh air. The captain perceiving, among others, a woman ſlave attempting to drown herſelf, pitched upon her as a proper example to the reſt: as he ſuppoſed that they did not know the terrors attending death, he ordered the woman to be tied with a rope under the arm-pits, and ſo let her down into the water. When the poor creature was thus plunged in, and about half way down, ſhe was heard to give a terrible ſhriek, which at firſt was aſcribed to her fears of drowning; but ſoon after the water appearing red all round her, ſhe was drawn up, and it was found that a ſhark, which had followed the ſhip, had bit her off from the middle.

Such is the frightful rapacity of this animal; nothing that has life is rejected. But it ſeems to have a peculiar enmity to man: when once it has taſted human fleſh, it never deſiſts from haunting thoſe places where it expects the return of its prey. It is even aſſerted, that along the coaſts of Africa, where theſe animals are found in great abundance, numbers of the

Negroes, who are obliged to frequent the waters, are ſeized and devoured by them every year. The people of theſe coaſts are firmly of opinion, that the ſhark loves the black man's fleſh in preference to the white; and that when men of different colours are in the water together, it always makes choice of the former.

However this be, men of all colours are equally afraid of this animal, and have contrived different methods to deſtroy him. In general, they derive their ſucceſs from the ſhark's own rapacity. The uſual method of our ſailors to take him, is by baiting a great hook with a piece of beef or pork, which is thrown out into the ſea by a ſtrong cord, ſtrengthened near the hook with an iron chain. Without this precaution, the ſhark would quickly bite the cord in two, and thus ſet himſelf free. It is no unpleaſant amuſement to obſerve this voracious animal coming up to ſurvey the bait, particularly when not preſſed by hunger. He approaches it, examines it, ſwims round it, ſeems for a while to neglect it, perhaps apprehenſive of the cord and the chain: he quits it for a little; but his appetite preſſing, he returns again; appears preparing to devour it, but quits it once more. When the ſailors have ſufficiently diverted themſelves with his

different evolutions, they then make a pretence, by drawing the rope, as if intending to take the bait away; it is then that the glutton's hunger excites him; he darts at the bait, and ſwallows it, hook and all. Sometimes, however, he does not ſo entirely gorge the whole, but that he once more gets free; yet even then, though wounded and bleeding with the hook, he will again purſue the bait until he is taken. When he finds the hook lodged in his maw, his utmoſt efforts are then excited, but in vain, to get free; he tries with his teeth to cut the chain; he pulls with all his force to break the line; he almoſt ſeems to turn his ſtomach inſide out, to diſgorge the hook: in this manner he continues his formidable though fruitleſs efforts; till quite ſpent, he ſuffers his head to be drawn above water, and the ſailors, confining his tail by a nooze, in this manner draw him on ſhip board, and diſpatch him. This is done by beating him on the head till he dies; yet even that is not effected without difficulty and danger; the enormous creature, terrible even in the agonies of death, ſtill ſtruggles with his deſtroyers; nor is there an animal in the world that is harder to be killed. Even when cut in pieces, the muſcles ſtill preſerve their motion, and vibrate for ſome minutes after being ſeparated from the body.

Another method of taking him, is by ſtriking a barbed inſtrument, called a fizgig, into his body, as he bruſhes along by the ſide of the ſhip. As ſoon as he is taken up, to prevent his flouncing, they cut off the tail with an ax, with the utmoſt expedition.

This is the manner in which Europeans deſtroy the ſhark; but ſome of the Negroes along the African coaſt, take a bolder and more dangerous method to combat their terrible enemy. Armed with nothing more than a knife, the Negroe plunges into the water, where he ſees the ſhark watching for his prey, and boldly ſwims forward to meet him; though the great animal does not come to provoke the combat, he does not avoid it, and ſuffers the man to approach him; but juſt as he turns upon his ſide to ſeize the aggreſſor, the Negroe watches the opportunity, plunges his knife in the fiſh's belly, and purſues his blows with ſuch ſucceſs that he lays the ravenous tyrant dead at the bottom: he ſoon however returns, fixes the fiſh's head in a nooze, and drags him to ſhore, where he makes a noble feaſt for the adjacent villages.

Nor is man alone the only enemy this fiſh has to fear: the Remora, or Sucking Fiſh, is probably a ſtill greater, and follows the ſhark

every where. This fiſh has got a power of adhering to whatever it ſticks againſt, in the ſame manner as a cupping-glaſs ſticks to the human body. It is by ſuch an apparatus that this animal ſticks to the ſhark, and drains away its moiſture. The ſeamen, however, are of opinion, that it is ſeen to attend on the ſhark for more friendly purpoſes, to point him to his prey, and to apprize him of his danger. For this reaſon it has been called the Shark's Pilot.

The ſhark ſo much reſembles the whale in ſize, that ſome have injudiciouſly ranked it in the claſs of cetaceous fiſhes; but its real rank is in the place here aſſigned it, among thoſe of the cartilaginous kind. It breathes with gills and lungs, its bones are griſtly, and it brings forth ſeveral living young; Belonius aſſures us, that he ſaw a female ſhark produce eleven live young ones at a time. But I will not take upon me to vouch for the veracity of Rondeletius, who, when talking of the blue ſhark, ſays, that the female will permit her ſmall brood, when in danger, to ſwim down her mouth, and take ſhelter in her belly. Mr. Penant indeed, ſeems to give credit to the ſtory, and thinks that this fiſh, like the Oppoſſum, may have a place fitted by Nature for the reception of her young. To his opinion much deference is due, and is ſuf-

ficient, at leaſt, to make us ſuſpend our aſſent; for nothing is ſo contemptible as that affectation of wiſdom which ſome diſplay, by univerſal incredulity.

Upon the whole, a ſhark, when living, is a very formidable animal; and, when dead, is of very little value. The fleſh is hardly digeſtible by any but the Negroes, who are fond of it to diſtraction; the liver affords three or four quarts of oil; ſome imaginary virtues have been aſcribed to the brain; and its ſkin is, by great labour, poliſhed into that ſubſtance called ſhagreen. Mr. Penant is of opinion, that the female is larger than the male in all this tribe; which would, if confirmed by experience, make a ſtriking agreement between them and birds of prey. It were to be wiſhed that ſucceeding hiſtorians would examine into this obſervation, which is offered only as a conjecture!

CHAP.

## CHAP. III.

### Of Cartilaginous Flat-Fiſh, or the Ray Kind.

THE ſame rapacity which impels the ſhark along the ſurface of the water, actuates the flat fiſh at the bottom. Leſs active and leſs formidable, they creep in ſecurity along the bottom, ſeize every thing that comes in their way; neither the hardeſt ſhells nor the ſharpeſt ſpines give protection to the animals that bear them; their inſatiable hunger is ſuch, that they devour all; and the force of their ſtomach is ſo great, that it eaſily digeſts them.

The whole of this kind reſemble each other very ſtrongly in their figure; nor is it eaſy without experience to diſtinguiſh one from another. The ſtranger to this dangerous tribe may imagine he is only handling a ſkate when he is inſtantly ſtruck numb by the torpedo; he may ſuppoſe he has caught a thornback till he is ſtung by the fire-flare. It will be proper, therefore, after deſcribing the general figure of theſe animals, to mark their differences.

All fiſh of the ray kind are broad, cartilaginous, ſwimming flat on the water, and having ſpines on different parts of their body, or at

the tail. They all have their eyes and mouth placed quite under the body, with apertures for breathing either about or near them. They all have teeth, or a rough bone, which anſwers the ſame purpoſe. Their bowels are very wide towards the mouth, and go on diminiſhing to the tail. The tail is very differently ſhaped from that of other fiſhes; and at firſt ſight more reſembling that of a quadrupede, being narrow, and ending either in a bunch or a point. But what they are chiefly diſtinguiſhed by is their ſpines or prickles, which the different ſpecies have on different parts of their body. Some are armed with ſpines both above and below; others have them on the upper part only; ſome have their ſpines at the tail; ſome have three rows of them, and others but one. Theſe prickles in ſome are comparatively ſoft and feeble; thoſe of others, ſtrong and piercing. The ſmalleſt of theſe ſpines are uſually inclining towards the tail; the larger towards the head.

It is by the ſpines that theſe animals are diſtinguiſhed from each other. The ſkate has the middle of the back rough, and a ſingle row of ſpines on the tail. The ſharp noſed ray has ten ſpines that are ſituated towards the middle of the back. The rough ray

has its ſpines ſpread indiſcriminately over the the whole back. The thorn-back has its ſpines diſpoſed in three rows upon the back. The fire flare has but one ſpine, but that indeed a terrible one. This dangerous weapon is placed on the tail, about four iches from the body, and is not leſs than five inches long. It is of a flinty hardneſs, the ſides thin, ſharp pointed, and cloſely and ſharply bearded the whole way. The laſt of this tribe that I ſhall mention is the torpedo; and this animal has no ſpines that can wound; but in the place of them it is poſſeſſed of one of the moſt potent and extraordinary faculties in nature.

Such are the principal differences that may enable us to diſtinguiſh animals, ſome of which are of very great uſe to mankind, from others that are terrible and noxious. With reſpect to their uſes indeed, as we ſhall ſoon ſee, they differ much; but the ſimilitude among them, as to their nature, appetites, and conformation, is perfect and entire. They are all as voracious as they are plenty; and as dangerous to a ſtranger as uſeful to him who can diſtinguiſh their differences.

Of all the larger fiſh of the ſea, theſe are the moſt numerous; and they owe their numbers to their ſize. Except the white ſhark and cachalot alone, there is no other fiſh that has a ſwallow

large enough to take them in; and their ſpines make them a ſtill more dangerous morſel. Yet the ſize of ſome is ſuch, that even the ſhark himſelf is unable to devour them: we have ſeen ſome of them in England weigh above two hundred pounds; but that is nothing to their enormous bulk in other parts of the world. Labat tells us of a prodigious ray that was ſpeared by the Negroes at Guadaloupe, which was thirteen feet eight inches broad, and above ten feet from the ſnout to the inſertion of the tail. The tail itſelf was in proportion, for it was no leſs than fifteen feet long; twenty inches broad at its inſertion, and tapering to a point. The body was two feet in depth; the ſkin as thick as leather, and marked with ſpots; which ſpots, in all of this kind, are only glands, that ſupply a mucous to lubricate and ſoften the ſkin. This enormous fiſh was utterly unfit to be eaten by the Europeans; but the Negroes choſe out ſome of the niceſt bits, and carefully ſalted them up as a moſt favourite proviſion.

Yet, large as this may ſeem, it is very probable that we have ſeen only the ſmalleſt of the kind; as they generally keep at the bottom, the largeſt of the kind are ſeldom ſeen; and, as they may probably have been growing for ages, the extent of their magnitude is un-

known. It is generally ſuppoſed, however, that they are the largeſt inhabitants of the deep; and, were we to credit the Norway Biſhop, there are ſome above a mile over. But to ſuppoſe an animal of ſuch magnitude is abſurd; yet the over-ſtretching the ſuppoſition does not deſtroy the probability that animals of this tribe grow to an enormous ſize.

The ray generally chuſes for its retreat ſuch parts of the ſea as have a black muddy bottom; the large ones keep at greater depths; but the ſmaller approach the ſhores, and feed upon whatever living animals they can ſurprize, or whatever putrid ſubſtances they meet with. As they are ravenous, they eaſily take the bait, yet will not touch it if it be taken up and kept a day or two out of water. Almoſt all fiſh appear much more delicate with regard to a baited hook than their ordinary food. They appear by their manner to perceive the line and to dread it; but the impulſe of their hunger is too great for their caution; and, even though they perceive the danger, if thoroughly hungry, they devour the deſtruction.

Theſe fiſh generate in March and April; at which time only they are ſeen ſwimming near the ſurface of the water, ſeveral of the males purſuing one female. They adhere ſo faſt to

gether in coition, that the fiſhermen frequently draw up both together, though only one has been hooked. The females are prolific to an extreme degree; there having been no leſs than three hundred eggs taken out of the body of a ſingle ray. Theſe eggs are covered with a tough horny ſubſtance, which they acquire in the womb; for before they deſcend into that, they are attached to the ovary pretty much in the ſame manner as in the body of a pullet. From this ovary, or egg-bag, as it is vulgarly called, the fiſh's eggs drop one by one into the womb, and there receive a ſhell by the concretion of the fluids of that organ. When come to the proper maturity, they are excluded, but never above one or two at a time, and often at intervals of three or four hours. Theſe eggs, or purſes, as the fiſhermen call them, are uſually caſt about the beginning of May, and they continue caſting during the whole ſummer. In October, when their breeding ceaſes, they are exceedingly poor and thin; but in November they begin to improve, and grow gradually better till May, when they are in the higheſt perfection.

It is chiefly during the winter ſeaſon that our fiſhermen take them; but the Dutch, who are indefatigable, begin their operations earlier,

and fiſh with better ſucceſs than we. The method practiſed by the fiſhermen of Scarborough is thought to be the beſt among the Engliſh; and, as Mr. Penant has given a very ſuccinct account of it, I will take leave to preſent it to the reader.

"When they go out to fiſh, each perſon is "provided with three lines: each man's lines "are fairly coiled upon a flat oblong piece of "wicker work; the hooks being baited and "placed very regularly in the centre of the coil. "Each line is furniſhed with two hundred and "eighty hooks, at the diſtance of ſix feet two "inches from each other. The hooks are "faſtened to lines of twiſted horſe-hair, twenty-"ſeven inches in length.

"When fiſhing, there are always three men "in each coble; and conſequently nine of theſe "lines are faſtened together and uſed as one "line, extending in length near three miles, "and furniſhed with above two thouſand five "hundred hooks. An anchor and a buoy are "fixed at the firſt end of the line, and one more "at each end of each man's lines: in all, "four anchors, and four buoys made of leather "or cork. The line is always laid acroſs the "current. The tides of flood and ebb continue "an equal time upon our coaſt; and, when

" undiſturbed by winds, run each way about " ſix hours. They are ſo rapid that the fiſher- " men can only ſhoot and haul their lines at the " turn of the tide; and therefore the lines al- " ways remain upon the ground about ſix hours. " The ſame rapidity of tide prevents their uſing " hand lines; and therefore two of the people " commonly wrap themſelves in the ſail and " ſleep, while the other keeps a ſtrict look-out, " for fear of being run down by ſhips, and to " obſerve the weather: for ſtorms often riſe " ſo ſuddenly, that it is ſometimes with extreme " difficulty they eſcape to the ſhore, though " they leave lines behind them.

" The coble is twenty feet ſix inches long, " and five feet extreme breadth. It is about " one ton burthen, rowed with three pair of " oars, and admirably conſtructed for the pur- " poſe of encountering a mountainous ſea. " They hoiſt ſail when the wind ſuits.

" The five-men-boat is forty feet long, " fifteen broad, and twenty-five tons burthen. " It is ſo called, though navigated by ſix men " and a boy; becauſe one of the men is hired " to cook, and does not ſhare in the profits " with the other five. All our able fiſhermen go " in theſe boats to the herring-fiſhery at Yar- " mouth, the latter end of September, and

" return about the middle of November. The " boats are then laid up until the beginning of " Lent, at which time they go off in them to " the edge of the Dogger, and other places, to " fiſh for turbot, cod, ling, ſkates, &c. They " always take two cobles on board, and when " they come upon their ground, anchor the " boat, throw out the cobles, and fiſh in the " ſame manner as thoſe do who go from the " ſhore in a coble; with this difference only, " that here each man is provided with double " the quantity of lines, and, inſtead of waiting " the return of the tide in the coble, return to " the boat and bait their other lines; thus " hawling one ſet, and ſhooting another, every " turn of tide. They commonly run into the " harbour twice a week, to deliver their fiſh. " The five-men-boat is decked at each end, " but open in the middle, and has two long " ſails.

" The beſt bait for all kinds of fiſh, is freſh " herring cut in pieces of a proper ſize; and, " notwithſtanding what has been ſaid to the " contrary, they are taken there at any time in " the winter, and all the ſpring, whenever the " fiſhermen put down their nets for that pur- " poſe: the five-men-boats always take ſome " nets for that end. Next to herrings are the

"leſſer lampreys, which come all winter by "land-carriage from Tadcaſter. The next baits "in eſteem are ſmall haddocks cut in pieces, "ſand worms, muſcles and limpets; and laſtly, "when none of theſe can be found, they uſe "bullock's liver. The hooks uſed there are "much ſmaller than thoſe employed at Iceland "and Newfoundland. Experience has ſhewn "that the larger fiſh will take a living ſmall "one upon the hook, ſooner than any bait that "can be put on; therefore they uſe ſuch as the "fiſh can ſwallow. The hooks are two inches "and an half long in the ſhank; and near an "inch wide between the ſhank and the point. "The line is made of ſmall cording, and is "always tanned before it is uſed. All the rays "and turbots are extremely delicate in their "choice of baits: if a piece of herring or had-"dock has been twelve hours out of the ſea, "and then uſed as a bait, they will not "touch it."

Such is the manner of fiſhing for thoſe fiſh that uſually keep near the bottom on the coaſts of England; and Duhamel obſerves, that the beſt weather for ſucceeding, is a half calm, when the waves are juſt curled with a ſilent breeze.

But this extent of line, which runs, as we have ſeen, three miles along the bottom, is

nothing to what the Italians throw out in the Mediterranean. Their fiſhing is carried on in a tartan, which is a veſſel much larger than our's; and they bait a line of no leſs than twenty miles long, with above ten or twelve thouſand hooks. This line is called the paraſina; and the fiſhing goes by that of the pielago. This line is not regularly drawn every ſix hours, as with us, but remains for ſome time in the ſea; and it requires the ſpace of twenty-four hours to take it up in. By this apparatus they take rays, ſharks, and other fiſh; ſome of which are above a thouſand pound weight. When they have caught any of this magnitude, they ſtrike them through with an harpoon to bring them on board, and kill them as faſt as they can.

This method of catching fiſh is obviouſly fatiguing and dangerous; but the value of the capture generally repays the pain. The ſkate and the thornback are very good food; and their ſize, which is from ten pounds to two hundred weight, very well rewards the trouble of fiſhing for them. But it ſometimes happens that the lines are viſited by very unwelcome intruders; by the rough ray, the fireflare, or the torpedo. To all theſe the fiſhermen have the moſt mortal antipathy; and, when diſcovered,

ſhudder at the ſight: however, they are not always ſo much upon their guard, but that they ſometimes feel the different reſentments of this angry tribe; and, inſtead of a prize, find they have caught a vindictive enemy. When ſuch is the caſe, they take care to throw them back into the ſea with the ſwifteſt expedition.

The rough ray inflicts but ſlight wounds with the prickles with which its whole body is furniſhed. To the ignorant it ſeems harmleſs, and a man would at firſt ſight venture to take it in his hand, without any apprehenſions; but he ſoon finds, that there is not a ſingle part of its body that is not armed with ſpines; and that there is no way of ſeizing the animal, but by the little fin at the end of the tail.

But this animal is harmleſs, when compared to the Fireflare, which ſeems to be the dread of even the boldeſt and moſt experienced fiſhermen. The weapon with which Nature has armed this animal, which grows from the tail, and which we deſcribed as barbed and five inches long, hath been an inſtrument of terror to the ancient fiſhermen as well as the moderns: and they have delivered many tremendous fables of its aſtoniſhing effects. Pliny, Ælian, and Oppian, have ſupplied it with a venom that affects even the inanimate creation: trees that

are ſtruck by it, inſtantly loſe their verdure; and rocks themſelves are incapable of reſiſting the potent poiſon. The enchantreſs Circe armed her ſon with a ſpear headed with the ſpine of the trygon, as the moſt irreſiſtible weapon ſhe could furniſh him with; a weapon that ſoon after was to be the death of his own father.

That ſpears and darts, ſays Mr. Penant, might in very early times have been headed with this bone inſtead of iron, we have no doubt. The Americans head their arrows with the bones of fiſhes to this day; and from their hardneſs and ſharpneſs, they are no contemptible weapons. But that this ſpine is poſſeſſed of thoſe venomous qualities aſcribed to it, we have every reaſon to doubt; though ſome men of high reputation, and the whole body of fiſhermen, contend for its venomous effects. It is, in fact, a weapon of offence belonging to this animal, and capable, from its barbs, of inflicting a very terrible wound, attended with dangerous ſymptoms; but it cannot be poſſeſſed of any poiſon, as the ſpine has no ſheath to preſerve the ſuppoſed venom on its ſurface; and the animal has no gland that ſeparates the noxious fluid: beſides, all thoſe animals that are furniſhed with envenomed fangs or ſtings, ſeem to have them ſtrongly connected with their ſafety and exiſtence; they never part with them; there

is an apparatus of poiſon prepared in the body to accompany their exertions; and when the fangs or ſtings are taken away, the animal languiſhes and dies But it is otherwiſe with the ſpine of the fireflare; it is fixed to the tail, as a quill is into the tail of a fowl, and is annually ſhed in the ſame manner: it may be neceſſary for the creature's defence, but is no way neceſſary for its exiſtence. The wound inflicted by an animal's tail, has ſomething terrible in the idea, and may from thence alone be ſuppoſed to be fatal. From hence terror might have added poiſon to the pain, and called up imagined dangers: the Negroes univerſally believe that the ſting is poiſonous; but they never die of the wound; for, by opening the fiſh, and laying it to the part injured, it effects a ſpeedy cure. The ſlightneſs of the remedy proves the innocence of the wound.

The Torpedo is an animal of this kind, equally formidable and well known with the former; but the manner of its operating, is to this hour a myſtery to mankind. The body of this fiſh is almoſt circular, and thicker than others of the ray kind; the ſkin is ſoft, ſmooth, and of a yellowiſh colour, marked, as all the kind, with large annular ſpots; the eyes very ſmall; the tail tapering to a point; and the weight

of the fiſh from a quarter to fifteen pounds; Redi found one twenty-four pounds weight. To all outward appearance, it is furniſhed with no extraordinary powers; it has no muſcles formed for particularly great exertions; no internal conformation perceptibly differing from he reſt of its kind: yet ſuch is that unaccountable power it poſſeſſes, that, the inſtant it is touched, it numbs not only the hand and arm, but ſometimes alſo the whole body. The ſhock received, by all accounts, moſt reſembles the ſtroke of an electrical machine; ſudden, tingling, and painful. "The inſtant," ſays Kempfer, "I touched it with my hand, I felt "a terrible numbneſs in my arm, and as far up "as the ſhoulder. Even if one treads upon it "with the ſhoe on, it affects not only the leg, "but the whole thigh upwards. Thoſe who "touch it with the foot, are ſeized with a "ſtronger palpitation than even thoſe who "touched it with the hand. This numbneſs "bears no reſemblance to that which we feel "when a nerve is a long time preſſed, and the "foot is ſaid to be aſleep; it rather appears "like a ſudden vapour, which paſſing through "the pores in an inſtant, penetrates to the very "ſprings of life, from whence it diffuſes itſelf "over the whole body, and gives real pain. "The nerves are ſo affected, that the perſon

"ſtruck imagines all the bones of his body, "and particularly thoſe of the limb that re- "ceived the blow, are driven out of joint. All "this is accompanied with an univerſal tremor, "a ſickneſs of the ſtomach, a general convul- "ſion, and a total ſuſpenſion of the faculties of "the mind. In ſhort," continues Kempfer, "ſuch is the pain, that all the force of our "promiſes and authority could not prevail upon "a ſea-man to undergo the ſhock a ſecond time. "A Negroe indeed, that was ſtanding by, rea- "dily undertook to touch the torpedo; and "was ſeen to handle it without feeling any of "its effects. He informed us, that his whole "ſecret conſiſted in keeping in his breath; "and we found, upon trial, that this method "anſwered with ourſelves. When we held in "our breath, the torpedo was harmleſs; but "when we breathed ever ſo little, its efficacy "took place."

Kempfer has very well deſcribed the effects of this animal's ſhock; but ſucceeding experience has abundantly convinced us, that holding in the breath, no way guards againſt its violence. Thoſe, therefore, who, depending on that receipt, ſhould play with a torpedo, would ſoon find themſelves painfully undeceived: not but that this fiſh may be many times touched with per-

fect ſecurity; for it is not upon every occaſion that it exerts its potency. Reaumur, who made ſeveral trials upon this animal, has at leaſt convinced the world that it is not neceſſarily, but by an effort, that the torpedo numbs the hand of him that touches it. He tried ſeveral times, and could eaſily tell when the fiſh intended the ſtroke, and when it was about to continue harmleſs. Always before the fiſh intended the ſtroke, it flattened the back, raiſed the head and the tail, and then, by a violent contraction in the oppoſite direction, ſtruck with its back againſt the preſſing finger, and the body, which before was flat, became humped and round.

But we muſt not infer, as he has done, that the whole effect of this animal's exertions ariſe from the greatneſs of the blow which the fingers receive at the inſtant they are ſtruck. We will, with him, allow, that the ſtroke is very powerful, equal to that of a muſquet-ball, ſince he will have it ſo; but it is very well known, that a blow, though never ſo great on the points of the fingers, diffuſes no numbneſs over the whole body: ſuch a blow might break the ends of the fingers indeed, but would hardly numb the ſhoulder. Thoſe blows that numb, muſt be applied immediately to ſome

great and leading nerves, or to a large ſurface of the body; a powerful ſtroke applied to the points of the fingers will be exceſſively painful indeed, but the numbneſs will not reach beyond the fingers themſelves. We muſt, therefore, look for another cauſe producing the powerful effects wrought by the torpedo.

Others have aſcribed it to a tremulous motion which this animal is found to poſſeſs, ſomewhat reſembling that of an horſe's ſkin, when ſtung by a fly. This operating under the touch with an amazing quickneſs of vibration, they ſuppoſe produces the uneaſy ſenſation deſcribed above; ſomething ſimilar to what we feel when we rub pluſh cloth againſt the grain. But the cauſe is quite diſproportioned to the effect; and ſo much beyond our experience, that this ſolution is as difficult as the wonder we want to explain.

The moſt probable ſolution ſeems to be, that the ſhock proceeds from an animal electricity, which this fiſh has ſome hidden power of ſtoring up, and producing on its moſt urgent occaſions. The ſhocks are entirely ſimilar; the duration of the pain is the ſame: but how the animal contrives to renew the charge, how it is prevented from evaporating it on contiguous objects, how it is originally procured, theſe are difficulties that time alone can elucidate.

But to know even the effects is wiſdom. Certain it is that the powers of this animal ſeem to decline with its vigour; for as its ſtrength ceaſes, the force of the ſhock ſeems to diminiſh; till, at laſt, when the fiſh is dead, the whole power is deſtroyed, and it may be handled or eaten with perfect ſecurity: on the contrary, when immediately taken out of the ſea, its force is very great, and not only affects the hand, but if even touched with a ſtick, the perſon finds himſelf ſometimes affected. This power, however, is not to be extended to the degree that ſome would have us believe; as reaching the fiſhermen at the end of the line, or numbing fiſhes in the ſame pond. Godignus, in his Hiſtory of Abyſſinia, carries this quality to a moſt ridiculous exceſs: he tells us of one of theſe that was put into a baſket among a number of dead fiſhes, and that the next morning the people, to their utter aſtoniſhment, perceived, that the torpedo had actually numbed the dead fiſhes into life again.

To conclude, it is generally ſuppoſed that the female torpedo is much more powerful than the male. Lorenzini, who has made ſeveral experiments upon this animal, ſeems convinced that its power wholly reſides in two thin muſcles that cover a part of the back,

Theſe he calls the trembling fibres; and he aſſerts that the animal may be touched with ſafety in any other part. It is now known alſo that there are more fiſh than this of the ray kind, poſſeſſed of the numbing quality, which has acquired them the name of the torpedo. Theſe are deſcribed by Atkins and Moore, and found in great abundance along the coaſt of Africa. They are ſhaped like a mackarel, except that the head is much larger; the effects of theſe ſeem alſo to differ in ſome reſpects. Moore talks of keeping his hand upon the animal; which in the ray torpedo it is actually impoſſible to do. "There was no man in the company," ſays he, "that could bear to keep his hand on "this animal the twentieth part of a minute, "it gave him ſo great pain; but upon taking "the hand away, the numbneſs went off, and "all was well again. This numbing quality "continued in this torpedo even after it was "dead; and the very ſkin was ſtill poſſeſſed of "its extraordinary power till it became dry." Condamime informs us of a fiſh poſſeſſed of the powers of the torpedo, of a ſhape very different from the former, and every way reſembling a lamprey. This animal, if touched by the hand, or even with a ſtick, inſtantly benumbs the hand and arm to the very ſhoulder; and ſome-

times the man falls down under the blow. Theſe animals, therefore, muſt affect the nervous ſyſtem in a different manner from the former, both with reſpect to the manner and the intention; but how this effect is wrought, we muſt be content to diſmiſs in obſcurity.

CHAP.

## CHAP. IV.

### Of the Lamprey and its Affinities.

THERE is a ſpecies of the Lamprey ſerved up as a great delicacy among the modern Romans, very different from ours. Whether theirs be the murena of the ancients I will not pretend to ſay; but there is nothing more certain than that our lamprey is not. The Roman lamprey agrees with the ancient fiſh in being kept in ponds, and conſidered by the luxurious as a very great delicacy.

The lamprey known among us is differently eſtimated, according to the ſeaſon in which it is caught, or the place where it has been fed. Thoſe that leave the ſea to depoſit their ſpawn in freſh waters are the beſt; thoſe that are entirely bred in our rivers, and that have never been at ſea, are conſidered as much inferior to the former. Thoſe that are taken in the months of March, April, or May, juſt upon their leaving the ſea, are reckoned very good; thoſe that are caught after they have caſt their ſpawn, are found to be flabby and of little value. Thoſe caught in ſeveral of the rivers in Ireland the people will not venture to touch; thoſe

of the Engliſh Severn are conſidered as the moſt delicate of all other fiſh whatever.

The lamprey much reſembles an eel in its general appearance, but is of a lighter colour, and rather a clumſier make. It differs however in the mouth, which is round, and placed rather obliquely below the end of the noſe. It more reſembles the mouth of a leech than an eel; and the animal has a hole on the top of the head through which it ſpouts water, as in the cetaceous kind. There are ſeven holes on each ſide for reſpiration; and the fins are formed rather by a lengthening out of the ſkin, than any ſet of bones or ſpines for that purpoſe. As the mouth is formed reſembling that of a leech, ſo it has a property reſembling that animal of ſticking cloſe to and ſucking any body it is applied to. It is extraordinary the power they have of adhering to ſtones; which they do ſo firmly as not to be drawn off without ſome difficulty. We are told of one that weighed but three pound; and yet it ſtuck ſo firmly to a ſtone of twelve pounds, that it remained ſuſpended at its mouth, from which it was ſeparated with no ſmall difficulty. This amazing power of ſuction is ſuppoſed to ariſe from the animal's exhauſting the air within its body by the hole over the noſe, while the mouth is cloſely fixed

to the object, and permits no air to enter. It would be eaſy to determine the weight this animal is thus able to ſuſtain; which will be equal to the weight of a column of air of equal diameter with the fiſh's mouth.

From ſome peculiarity of formation, this animal ſwims generally with its body as near as poſſible to the ſurface; and it might eaſily be drowned by being kept by force for any time under water. Muralto has given us the anatomy of this animal; but, in a very minute deſcription, makes no mention of lungs. Yet I am very apt to ſuſpect, that two red glands tiſſued with nerves, which he deſcribes as lying towards the back of the head, are no other than the lungs of this animal. The abſolute neceſſity it is under of breathing in the air, convinces me that it muſt have lungs, though I do not know of any anatomiſt that has deſcribed them.

The adheſive quality in the lamprey may be in ſome meaſure encreaſed by that ſlimy ſubſtance with which its body is all over ſmeared; a ſubſtance that ſerves at once to keep it warm in its cold element, and alſo to keep its ſkin ſoft and pliant. This mucous is ſeparated by two long lymphatic canals, that extend on each ſide from the head to the tail, and that furniſh

it in great abundance. As to its inteſtines, it ſeems to have but one great bowel, running from the mouth to the vent, narrow at both ends, and wide in the middle.

So ſimple a conformation ſeems to imply an equal ſimplicity of appetite. In fact, the lamprey's food is either ſlime and water, or ſuch ſmall water-inſects as are ſcarce perceivable. Perhaps its appetite may be more active at ſea, of which it is properly a native; but when it comes up into our rivers, it is hardly perceived to devour any thing.

Its uſual time of leaving the ſea, which it is annually ſeen to do in order to ſpawn, is about the beginning of ſpring; and after a ſtay of a few months it returns again to the ſea. Their preparation for ſpawning is peculiar; their manner is to make holes in the gravelly bottom of rivers; and on this occaſion their ſucking power is particularly ſerviceable; for if they meet with a ſtone of a conſiderable ſize, they will remove it and throw it out. Their young are produced from eggs in the manner of flat fiſh; the female remains near the place where they are excluded, and continues with them till they come forth. She is ſometimes ſeen with her whole family playing about her; and after ſome time ſhe conducts them in triumph back to the ocean.

But ſome have not ſufficient ſtrength to return; and theſe continue in the freſh water till they die. Indeed, the life of this fiſh, according to Rondeletius, who has given its hiſtory, is but of very ſhort continuance; and a ſingle brood is the extent of the female's fertility. As ſoon as ſhe has returned after caſting her eggs, ſhe ſeems exhauſted and flabby. She becomes old before her time; and two years is generally the limit of her exiſtence.

However this may be, they are very indifferent eating after they have caſt their eggs, and particularly at the approach of hot weather. The beſt ſeaſon for them is the months of March, April, and May; and they are uſually taken in nets with ſalmon, and ſometimes in baſkets at the bottom of the river. It has been an old cuſtom for the city of Glouceſter, annually to preſent the king with a lamprey-pye; and as the gift is made at Chriſtmaſs, it is not without great difficulty the corporation can procure the proper quantity, though they give a guinea a piece for taking them.

How much they were valued among the ancients, or a fiſh bearing ſome reſemblance to them, appears from all the claſſics that have praiſed good living or ridiculed gluttony. One ſtory we are told of this fiſh with which I will

conclude its hiſtory. A ſenator of Rome, whoſe name does not deſerve being tranſmitted to poſterity, was famous for the delicacy of his lampreys. Tigelinus, Manucius, and all the celebrated epicures of Rome, were loud in his praiſes: no man's fiſh had ſuch a flavour, was ſo nicely fed, or ſo exactly pickled. Auguſtus, hearing ſo much of this man's entertainments, deſired to be his gueſt; and ſoon found that fame had been juſt to his merits; the man had indeed very fine lampreys, and of an exquiſite flavour. The emperor was deſirous of knowing the method by which he fed his fiſh to ſo fine a reliſh; and the glutton, making no ſecret of his art, informed him that his way was to throw into his ponds ſuch of his ſlaves as had at any time diſpleaſed him. Auguſtus, we are told, was not much pleaſed with his receipt; and inſtantly ordered all his ponds to be filled up. The ſtory would have ended better if he had ordered the owner to be flung in alſo.

CHAP.

*Elias Martin sculp.*

The Sturgeon.
The Myſtus.

## CHAP. VIII.

### The Sturgeon and its Varieties.

THE Sturgeon, with a form as terrible and a body as large as the ſhark, is yet as harmleſs as the fiſh we have been juſt deſcribing; incapable and unwilling to injure others, it flies from the ſmalleſt fiſhes, and generally falls a victim to its own timidity.

The ſturgeon in its general form reſembles a freſh-water pike. The noſe is long; the mouth is ſituated beneath, being ſmall, and without jaw-bones or teeth. But, though it is ſo harmleſs and ill provided for war, the body is formidable enough to appearance. It is long, pentagonal, and covered with five rows of large bony knobs, one row on the back and two on each ſide, and a number of fins to give it greater expedition. Of this fiſh there are three kinds; the Common Sturgeon, the Caviar Sturgeon, and the Huſo or Iſinglaſs fiſh. The firſt has eleven knobs or ſcales on the back; the ſecond has fifteen; and the latter thirteen on the back and forty-three on the tail. Theſe differences ſeem ſlight to us who only conſider the animal's form; but thoſe who conſider its uſes

find the diſtinction of conſiderable importance. The firſt is the ſturgeon, the fleſh of which is ſent pickled into all parts of Europe. The ſecond is the fiſh from the roe of which that noted delicacy called caviar is made; and the third, beſides ſupplying the caviar, furniſhes alſo the valuable commodity of iſinglaſs. They all grow to a very great ſize; and ſome of them have been found above eighteen feet long.

There is not a country in Europe but what this fiſh viſits at different ſeaſons; it annually aſcends the largeſt rivers to ſpawn, and propagates in an amazing number. The inhabitants along the banks of the Po, the Danube, and the Walga, make great profit yearly of its incurſions up the ſtream, and have their nets prepared for its reception. The ſturgeon alſo is brought daily to the markets of Rome and Venice, and they are known to abound in the Mediterranean ſea. Yet thoſe fiſh that keep entirely either in ſalt or freſh water are but comparatively ſmall. When the ſturgeon enjoys the viciſſitude of freſh and ſalt water, it is then that it grows to an enormous ſize, ſo as almoſt to rival even the whale in magnitude.

Nor are we without frequent viſits from this much eſteemed fiſh in England. It is often accidentally taken in our rivers in ſalmon-nets,

particularly in thoſe parts that are not far remote from the ſea. The largeſt we have heard of caught in Great-Britain was a fiſh taken in the Eſke, where they are moſt frequently found, which weighed four hundred and ſixty pounds. An enormous ſize to thoſe who have only ſeen our freſh-water fiſhes!

North-America alſo furniſhes the ſturgeon; their rivers in May, June, and July, ſupply them in very great abundance. At that time they are ſeen ſporting in the water, and leaping from its ſurface ſeveral yards into the air. When they fall again on their ſides, the concuſſion is ſo violent, that the noiſe is heard in ſtill weather at ſome miles diſtance.

But of all places where this animal is to be found, it appears no where in ſuch numbers as in the Lakes of Friſchehaff and Curiſchaff, near the city of Pillau. In the rivers alſo that empty themſelves into the Euxine Sea this fiſh is caught in great numbers, particularly at the mouth of the river Don. In all theſe places the fiſhermen regularly expect their arrival from the ſea, and have their nets and ſalt ready prepared for their reception.

As the ſturgeon is an harmleſs fiſh and no way voracious, it is never caught by a bait in the ordinary manner of fiſhing, but always in

nets. From the deſcription given above of its mouth, it is not to be ſuppoſed that the ſturgeon would ſwallow any hook capable of holding ſo large a bulk and ſo ſtrong a ſwimmer. In fact, it never attempts to ſeize any of the finny tribe, but lives by rooting at the bottom of the ſea, where it makes inſects and ſea-plants its whole ſubſiſtence. From this quality of floundering at the bottom it has received its name; which comes from the German verb *ſtoeren*, ſignifying to wallow in the mud. That it lives upon no large animals is obvious to all thoſe who cut it open, where nothing is found in its ſtomach but a kind of ſlimy ſubſtance, which has induced ſome to think it lives only upon water and air. From hence there is a German proverb, which is applied to a man extremely temperate, when they ſay he is as moderate as a ſturgeon.

As the ſturgeon is ſo temperate in its appetites, ſo is it alſo equally timid in its nature. There would be ſcarce any method of taking it did not its natural deſire of propagation induce it to incur ſo great a variety of dangers. The ſmalleſt fiſh is alone ſufficient to terrify a ſhoal of ſturgeons; for, being unfurniſhed with any weapon of defence, they are obliged to truſt to their ſwiftneſs and their caution for ſecurity. Like all animals

that do not make war upon others, ſturgeons live in ſociety among themſelves; rather for the purpoſes of pleaſure, than from any power of mutual protection. Geſner even aſſerts, that they are delighted with ſounds of various kinds; and that he has ſeen them ſhoal together, at the notes of a trumpet.

The uſual time, as was ſaid before, for the ſturgeon to come up rivers to depoſit its ſpawn, is about the beginning of ſummer, when the fiſhermen of all great rivers make a regular preparation for its reception. At Pillau particularly the ſhores are formed into diſtricts, and allotted to companies of fiſhermen, ſome of which are rented for about three hundred pounds a year. The nets in which the ſturgeon are caught, are made of ſmall cord, and placed acroſs the mouth of the river; but in ſuch a manner that, whether the tide ebbs or flows, the pouch of the net goes with the ſtream. The ſturgeon thus caught, while in the water, is one of the ſtrongeſt fiſhes that ſwims, and often breaks the net to pieces that encloſes it; but the inſtant it is raiſed with its head above water, all its activity ceaſes: it is then a lifeleſs, ſpiritleſs lump, and ſuffers itſelf to be tamely dragged on ſhore. It has been found prudent, however, to draw it to ſhore gently; for, if

excited by any unneceſſary violence, it has been found to break the fiſhermen's legs with a blow of its tail. The moſt experienced fiſhers, therefore, when they have drawn it to the brink, keep the head ſtill elevated, which prevents its doing any miſchief with the hinder part of the body: others, by a nooze, faſten the head and the tail together; and thus, without immediately diſpatching it, bring it to the market, if there be one near; or keep it till their number is completed for exportation.

The fleſh of this animal pickled is very well known at all the tables of Europe; and is even more prized in England, than in any of the countries where it is uſually caught. The fiſhermen have two different methods of preparing it. The one is by cutting it in long pieces lengthwiſe, and having ſalted them, by hanging them up in the ſun to dry: the fiſh thus prepared is ſold in all the countries of the Levant, and ſupplies the want of better proviſion. The other method, which is uſually practiſed in Holland, and along the ſhores of the Baltic, is to cut the ſturgeon croſswiſe into ſhort pieces, and put it into ſmall barrels, with a pickle made of ſalt and ſaumure. This is the ſturgeon which is ſold in England; and of which great quantities came from the north,

until we gave encouragement to the importation of it from North America. From thence we are very well ſupplied; but it is ſaid, not with ſuch good fiſh as thoſe imported from the north of Europe.

A very great trade is alſo carried on with the roe of the ſturgeon, preſerved in a particular manner, and called Caviar: it is made from the roe of all kinds of ſturgeon, but particularly the ſecond. This is much more in requeſt in other countries of Europe than with us. To all theſe high reliſhed meats, the appetite muſt be formed by degrees; and though formerly even in England it was very much in requeſt at the poliſheſt tables, it is at preſent ſunk entirely into diſuſe. It is ſtill, however, a conſiderable merchandize among the Turks, Greeks, and Venetians. Caviar ſomewhat reſembles ſoft ſoap in conſiſtence; but it is of a brown, uniform colour, and is eaten as cheeſe with bread. The manner of making it is this: they take the ſpawn from the body of the ſturgeon—for it is to be obſerved that the ſturgeon differs from other cartilaginous fiſh, in that it has ſpawn like a cod, and not eggs like a ray.—They take the ſpawn, I ſay, and freeing it from the ſmall membranes that connect it together, they waſh it with vinegar, and afterwards ſpread it

to dry upon a table; they then put it into a veſſel with ſalt, breaking the ſpawn with their hands, and not with a peſtle; this done, they put it into a canvas bag, letting the liquor drain from it; laſtly, they put it in a tub, with holes in the bottom, ſo that, if there be any moiſture ſtill remaining, it may run out: then it is preſſed down, and covered up cloſe for uſe.

But the Huſo or Iſinglaſs Fiſh furniſhes a ſtill more valuable commodity. This fiſh is caught in great quantities in the Danube, from the months of October to January: it is ſeldom under fifty pounds weight, and often above four hundred: its fleſh is ſoft, glutinous and flabby; but it is ſometimes ſalted, which makes it better taſted, and then it turns red like ſalmon. It is for the commodity it furniſhes that it is chiefly taken. Iſinglaſs is of a whitiſh ſubſtance, enclining to yellow, done up into rolls, and ſo exported for uſe. It is very well known as ſerviceable not only in medicine, but many arts. The varniſher, the wine-merchant, and even the clothier know its uſes; and very great ſums are yearly expended upon this ſingle article of commerce. The manner of making it is this: they take the ſkin, the entrails, the fins and the tail of this fiſh, and cut them into ſmall pieces; theſe are left to macerate in a ſufficient

quantity of warm water, and they are all boiled ſhortly after with a ſlow fire, until they are diſſolved and reduced to a jelly; this jelly is ſpread upon inſtruments made for the purpoſe, ſo, that drying, it aſſumes the form of parchment, and, when quite dry, it is then rolled into the form which we ſee it in the ſhops.

This valuable commodity is principally furniſhed from Ruſſia, where they prepare great quantities ſurprizingly cheap. Mr. Jackſon, an ingenious countryman of our own, found out an obvious method of making a glue at home that anſwered all the purpoſes of iſinglaſs; but what with the trouble of making it, and perhaps the arts put in practice to underſell him, he was, as I am told, obliged to diſcontinue the improvement of his diſcovery. Indeed, it is a vain attempt to manufacture among ourſelves thoſe things which may be more naturally and cheaply ſupplied elſewhere. We have many traders that are unnaturally, if I may ſo expreſs it, employed among us; who furniſh more laborioufly thoſe neceſſaries with which other countries could eaſily and cheaply ſupply us. It would be wiſer to take what they can thus produce; and to turn our artizans to the encreaſe and manufacture of ſuch productions as thrive more readily among us. Were, for inſtance,

the number of hands that we have now employed in the manufacture of ſilk, turned to the encreaſe of agriculture, it is probable that the encreaſed quantity of corn thus produced, would be more than an equivalent for the diminution of national wealth in purchaſing wrought ſilk from other countries.

CHAP.

E. Martin sc.

1 The Frog Fish. 2 The Sun Fish.

## CHAP. IX.

### Of Anomalous Cartilaginous Fiſhes.

OF all others, the cartilaginous claſs ſeems to abound with the greateſt variety of ill-formed animals; and, if philoſophy could allow the expreſſion, we might ſay, that the cartilaginous claſs was the claſs of monſters: in fact, it exhibits a variety of ſhapeleſs beings, the deviations of which from the uſual form of fiſhes are beyond the power of words to deſcribe, and ſcarcely of the pencil to draw. In this claſs we have the Pipe Fiſh, that almoſt tapers to a thread, and the Sun Fiſh, that has the appearance of a bulky head, but the body cut off in the middle; the Hippocampus, with an head ſomewhat like that of an horſe, and the Water Bat, whoſe head can ſcarcely be diſtinguiſhed from the body. In this claſs we find the Fiſhing Frog, which from its deformity ſome have called the Sea Devil, the Chimæra, the Lump Fiſh, the Sea Porcupine, and the Sea Snail. Of all theſe the hiſtory is but little known; and naturaliſts ſupply the place with deſcription.

The Sun Fiſh ſometimes grows to a very

large ſize; one taken near Plymouth was five hundred weight. In form it reſembles a bream, or ſome deep fiſh cut off in the middle: the mouth is very ſmall, and contains in each jaw two broad teeth, with ſharp edges: the colour of the back is duſky and dappled, and the belly is of a ſilvery white. When boiled, it has been obſerved to turn to a glutinous jelly, and would moſt probably ſerve for all the purpoſes of iſinglaſs, were it found in ſufficient plenty.

The Fiſhing Frog in ſhape very much reſembles a tadpole or young frog, but then a tadpole of enormous ſize, for it grows to above five feet long, and its mouth is ſometimes a yard wide. Nothing can exceed its deformity. The head is much bigger than the whole body; the under jaw projects beyond the upper, and both are armed with rows of ſlender, ſharp teeth: the palate and the tongue are furniſhed with teeth in like manner; the eyes are placed on the top of the head, and are encompaſſed with prickles: immediately above the noſe are two long beards or filaments, ſmall in the beginning, but thicker at the end, and round: theſe, as it is ſaid, anſwer a very ſingular purpoſe; for being made ſomewhat reſembling a fiſhing-line, it is aſſerted, that the animal converts them to the purpoſes of fiſhing. With theſe extended, as

Pliny aſſerts, the fiſhing frog hides in muddy waters, and leaves nothing but the beards to be ſeen; the curioſity of the ſmaller fiſh bring them to view theſe filaments, and their hunger induces them to ſeize the bait; upon which the animal in ambuſh inſtantly draws in its filaments with the little fiſh that had taken the bait, and devours it without mercy. This ſtory, though apparently improbable, has found credit among ſome of our beſt naturaliſts; but what induces me to doubt the fact is, that there is another ſpecies of this animal that has no beards, which it would not want if they were neceſſary to the exiſtence of the kind. Rondeletius informs us, that if we take out the bowels, the body will appear with a kind of tranſparence; and that if a lighted candle be placed within the body, as in a lanthorn, the whole has a very formidable appearance. The fiſhermen, however, have in general a great regard for this ugly fiſh, as it is an enemy to the dog fiſh, the bodies of thoſe fierce and voracious animals being often found in its ſtomach: whenever they take it, therefore, they always ſet it at liberty.

The Lump Fiſh is trifling in ſize, compared to the former: its length is but ſixteen inches, and its weight about four pounds; the ſhape of the body is like that of a bream, deep, and it

ſwims edgeways; the back is ſharp and elevated, and the belly flat; the lips, mouth and tongue of this animal are of a deep red; the whole ſkin is rough, with bony knobs, the largeſt row is along the ridge of the back; the belly is of a bright crimſon colour: but what makes the chief ſingularity in this fiſh, is an oval aperture in the belly, ſurrounded with a fleſhy, ſoft ſubſtance, that ſeems bearded all round; by means of this part it adheres with vaſt force to any thing it pleaſes. If flung into a pail of water, it will ſtick ſo cloſe to the bottom, that on taking the fiſh by the tail, one may lift up pail and all, though it holds ſeveral gallons of water. Great numbers of theſe fiſh are found along the coaſts of Greenland in the beginning of ſummer, where they reſort to ſpawn. Their roe is remarkably large, and the Greenlanders boil it to a pulp for eating. They are extremely fat, but not admired in England, being both flabby and inſipid.

The Sea Snail takes its name from the ſoft and unctuous texture of its body, reſembling the ſnail upon land. It is almoſt tranſparent, and ſoon diſſolves and melts away. It is but a little animal, being not above five inches long. The colour, when freſh taken, is of a pale brown, the ſhape of the body round, and the

back fin reaches all the way from the head to the tail. Beneath the throat is a round depreſſion, of a whitiſh colour, ſurrounded by twelve brown ſpots, placed in a circle. It is taken in England at the mouths of rivers, four or five miles diſtant from the ſea.

The body of the Pipe Fiſh, in the thickeſt part, is not thicker than a ſwan-quill, while it is above ſixteen inches long. This is angular, but the angles being not very ſharp, they are not diſcernable until the fiſh is dried. Its general colour is an olive brown, marked with numbers of bluiſh lines, pointing from the back to the belly. It is viviparous; for, on cruſhing one that was juſt taken, hundreds of very minute young ones were obſerved to crawl about.

The Hippocampus, which from the form of its head ſome call the Sea Horſe, never exceeds nine inches in length. It is about as thick as a man's thumb, and the body is ſaid, while alive, to have hair on the fore part, which falls off when it is dead. The ſnout is a ſort of a tube with a hole at the bottom, to which there is a cover, which the animal can open and ſhut at pleaſure. Behind the eyes there are two fins, which look like ears; and above them are two holes, which ſerve for reſpiration. The whole body ſeems to be compoſed of cartilagi-

nous rings, on the intermediate membranes of which ſeveral ſmall prickles are placed. It is found in the Mediterranean, and alſo in the Weſtern Ocean; and, upon the whole, more reſembles a great caterpillar than a fiſh. The antients conſidered it as extremely venomous; probably induced by its peculiar figure.

From theſe harmleſs animals, covered with a ſlight coat of mail, we may proceed to others, more thickly defended, and more formidably armed, whoſe exact ſtation in the ſcale of fiſhes is not yet aſcertained. While Linnæus ranks them among the Cartilaginous kinds, a later naturaliſt places them among the Spinous claſs. With which tribe they moſt agree, ſucceeding obſervations muſt determine. At preſent, we ſeem better acquainted with their figure than their hiſtory: their deformity is obvious; and the venemous nature of the greateſt number, has been confirmed by fatal experience. This circumſtance, as well as the happy diſtance at which they are placed from us, being all found in the Oriental or American ſeas, may have prevented a more critical enquiry; ſo that we know but little of the nature of their maligrity, and ſtill leſs of their purſuits and enmities in the deep.

In the firſt of this tribe we may place the

E. Martin sculp.

## The Sea Hedghog.

1 The Sea Orb.

2 The Oftracion.

Sea Orb, which is almoſt round, has a mouth like a frog, and is from ſeven inches to two feet long. Like the porcupine, from whence it ſometimes takes its name, being alſo called the Sea Porcupine, it is covered over with long thorns or prickles, which point on every ſide; and, when the animal is enraged, it can blow up its body as round as a bladder. Of this extraordinary creature there are many kinds: ſome threatening only with ſpines, as the Sea Hedge-hog; others defended with a bony helmet that covers the head, as the Oſtracion; others with a coat of mail from the head to the tail, where it terminates in a point, as the Centriſcus; and others ſtill armed offenſively and defenſively with bones and ſpines, as the Shield Orb.

Of theſe ſcarce one is without its peculiar weapon of offence. The centriſcus wounds with its ſpine; the oſtracion poiſons with its venom; the orb is impregnable, and is abſolutely poiſonous, if eaten. Indeed, their figure is not ſuch as would tempt one to make the experiment; and the natives of thoſe countries where they are found, are careful to inform foreigners of their danger: yet a certain ſailor at the Cape of Good Hope, not believing what the Dutch told him concerning their venom,

was reſolved to make the experiment, and break through a prejudice which he ſuppoſed was founded on the animal's deformity. He tried and eat one; but his raſhneſs coſt him his life; he inſtantly fell ſick, and died a few days after.

Theſe frightful animals are of different ſizes; ſome not bigger than a foot-ball, and others as large as a buſhel. They almoſt all flatten and erect their ſpines at pleaſure, and encreaſe the terrors of their appearance in proportion to the approach of danger. At firſt they ſeem more inoffenſive; their body oblong, with all their weapons pointing towards the tail; but upon being provoked or alarmed, the body that before ſeemed ſmall ſwells to the view; the animal viſibly grows rounder and larger, and all its prickles ſtand upright, and threaten the invader on every ſide. The Americans often amuſe themſelves with the barren pleaſure of catching theſe frightful creatures by a line and hook baited with a piece of ſea-crab. The animal approaches the bait with its ſpines flattened; but when hooked and ſtopped by the line, ſtraight all its ſpines are erected; the whole body being armed in ſuch a manner at all points, that it is impoſſible to lay hold of it on any part. For this reaſon it is dragged to ſome diſtance from the water, and there it quickly

expires. In the middle of the belly of all theſe there is a ſort of bag or bladder filled with air, and by the inflation of which the animal ſwells itſelf in the manner already mentioned.

In deſcribing the deformed animals of this claſs, one is ſometimes at a loſs whether it be a fiſh or an inſect that lies before him. Thus the hippocampus and the pipe-fiſh bear a ſtrong reſemblance to the caterpillar and the worm; while the leſſer orb bears ſome likeneſs to the claſs of ſea-eggs to be deſcribed after. I will conclude this account of cartilaginous fiſhes with the deſcription of an animal which I would ſcarcely call a fiſh, but that Father Labat dignifies it with the name. Indeed, this claſs teems with ſuch a number of odd ſhaped animals, that one is prompted to rank every thing extraordinary of the finny ſpecies among the number; but beſides, Labat ſays its bones are cartilaginous, and that may entitle it to a place here.

The animal I mean is the Galley Fiſh, which Linnæus degrades into the inſect tribe, under the title of the Meduſa, but which I chuſe to place in this tribe, from its habits that are ſomewhat ſimilar. To the eye of an unmindful ſpectator, this fiſh ſeems a tranſparent bubble ſwimming on the ſurface of the ſea, or like a bladder variouſly and beautifully painted with

vivid colours, where red and violet predominate as variouſly oppoſed to the beams of the ſun. It is however an actual fiſh; the body of which is compoſed of cartilages, and a very thin ſkin filled with air, which thus keeps the animal floating on the ſurface as the waves and the winds happen to drive. Sometimes it is ſeen thrown on the ſhore by one wave, and again waſhed back into the ſea by another. Perſons who happen to be walking along the ſhore often happen to tread upon theſe animals; and the burſting of their body yields a report like that when one treads upon the ſwim of a fiſh. It has eight broad feet with which it ſwims, or which it expands to catch the air as with a ſail. It faſtens itſelf to whatever it meets by means of its legs, which have an adheſive quality. Whether they move when on ſhore Labat could never perceive, though he did every thing to make them ſtir; he only ſaw that it ſtrongly adhered to whatever ſubſtances he applied it. It is very common in America, and grows to the ſize of a gooſe-egg, or ſomewhat more. It is perpetually ſeen floating; and no efforts that are uſed to hurt it can ſink it to the bottom. All that appears above water is a bladder clear and tranſparent as glaſs, and ſhining with the moſt beautiful colours of the rainbow. Beneath, in

the water, are four of the feet already mentioned that ſerve as oars, while the other four are expanded above to ſail with. But what is moſt remarkable in this extraordinary creature is the violent pungency of the ſlimy ſubſtance with which its legs are ſmeared. If the ſmalleſt quantity but touch the ſkin, ſo cauſtic is its quality, that it burns it like hot oil dropped on the part affected. The pain is worſt in the heat of the day, but ceaſes in the cool of the evening. It is from feeding on theſe that he thinks the poiſonous quality contracted by ſome Weſt-Indian fiſh may be accounted for. It is certain theſe animals are extremely common along all the coaſts in the Gulf of Mexico; and whenever the ſhore is covered with them in an unuſual manner, it is conſidered as a certain fore-runner of a ſtorm.

# PART III.

OF

# *SPINOUS FISHES.*

## CHAP. I.

### The Diviſion of Spinous Fiſhes.

THE third general diviſion of fiſhes is into that of the Spinous or bony kind. Theſe are obviouſly diſtinguiſhed from the reſt by having a complete bony covering to their gills; by their being furniſhed with no other method of breathing but gills only; by their bones which are ſharp and thorny; and their tails, which are placed in a ſituation perpendicular to the body. This is that claſs which alone our later naturaliſts are willing to admit as fiſhes. The Cetaceous claſs with them are but beaſts that have taken up their abode in the ocean; the Cartaliginous claſs are an amphibious band, that are but half denizens of that element: it is fiſhes of the Spinous kind that really deſerve the appellation.

This diſtinction the generality of mankind will hardly allow; but whatever be the juſtice of this preference in favour of the ſpinous claſs, it is certain that the cetaceous and cartilaginous claſſes bear no proportion to them in number. Of the ſpinous claſſes are already known above four hundred ſpecies; ſo that the numbers of the

former are trifling in compariſon, and make not above a fifth part of the finny creation.

From the great variety in this claſs, it is obvious how difficult a taſk it muſt have been to deſcribe or remember even a part of what it contains. When ſix hundred different ſorts of animals offer themſelves to conſideration, the mind is bewildered in the multiplicity of objects that all lay ſome claim to its attention. To obviate this confuſion, ſyſtems have been deviſed, which, throwing ſeveral fiſhes that agree in many particulars into one groupe, and thus uniting all into ſo many particular bodies, the mind that was incapable of ſeparately conſidering each, is enabled to comprehend all when thus offered in larger maſſes to its conſideration.

Indeed, of all the beings in animated nature, fiſhes moſt demand a ſyſtematical arrangement. Quadrupedes are but few, and can be all known; birds, from their ſeldom varying in their ſize, can be very tolerably diſtinguiſhed without ſyſtem; but among fiſhes, which no ſize can diſcriminate, where the animal ten inches and the animal ten feet long is entirely the ſame, there muſt be ſome other criterion by which they are to be diſtinguiſhed; ſomething that gives preciſion to our ideas of the animal whoſe hiſtory we deſire to know.

Of the real hiſtory of fiſhes, very little is yet known; but of very many we have full and ſufficient accounts, as to their external form. It would be unpardonable, therefore, in an hiſtory of theſe animals, not to give the little we do know; and, at leaſt, arrange our forces, though we cannot tell their deſtination. In this art of arrangement, Artedi and Linnæus have long been conſpicuous: they have both taken a view of the animal's form in different lights; and, from the parts which moſt ſtruck them, have founded their reſpective ſyſtems.

Artedi, who was foremoſt, perceiving that ſome fiſhes had hard prickly fins, as the pike; that others had ſoft pliant ones, as the herring; and that others ſtill wanted that particular fin, by which the gills are opened and ſhut, as the eel, made out a ſyſtem from theſe varieties. Linnæus, on the other hand, rejecting this ſyſtem, which he found liable to too many exceptions, conſidered the fins, not with regard to their ſubſtance, but their poſition. The ventral fins ſeem to be the great object of his ſyſtem; he conſiders them in fiſhes ſupplying the ſame offices as feet in quadrupedes; and from their total abſence, or from their being ſituated nearer the head or the tail, in different fiſhes, he takes the differences of his ſyſtem.

Theſe arrangements, which are totally arbitrary, and which are rather a method than a ſcience, are always fluctuating; and the laſt is generally preferred to that which went before. There has lately appeared, however, a ſyſtem, compoſed by Mr. Gouan of Montpellier, that deſerves applauſe for more than its novelty. It appears to me the beſt arrangement of this kind that ever was made; and in it the diviſions are not only preciſely ſyſtematical, but in ſome meaſure adopted by nature itſelf. This learned Frenchman has united the ſyſtems of Artedi and Linnæus together; and by bringing one to correct the other, has made out a number of tribes, that are marked with the utmoſt preciſion. A part of his ſyſtem, however, we have already gone through in the cartilaginous, or, as he calls a part of them, the *branchioſtegous* tribe of fiſhes. In the arrangement of theſe I have followed Linnæus, as the number of them was but ſmall, and his method ſimple. But in that which is more properly called the Spinous claſs of fiſhes, I will follow Mr. Gouan's ſyſtem; the terms of which, as well as of all the former ſyſtems, require ſome explanation. I do not love to multiply the technical terms of a ſcience; but it often happens that names, by being long uſed, are as neceſſary to be known as the ſcience itſelf.

If we conſider the ſubſtance of the fin of a fiſh, we ſhall find it compoſed, beſides the ſkin, either of ſtraight, hard, pointed, bony prickles or ſpines, as in the pike; or of ſoft, crooked or forked bones, or cartilages, as in the herring. The fiſh that have bony prickly fins, are called Prickly Finned Fiſh; the latter, that have ſoft or cartilaginous fins, are called, Soft Finned Fiſh. The prickly finned fiſh have received the Greek new-formed name of *Acanthopterigii*; the ſoft finned fiſh have likewiſe their barbarous Greek name of *Malacopterigii*. Thus far Artedi has ſupplied Mr. Gouan with names and diviſions. All Spinous fiſh are divided into Prickly finned fiſh, and Soft finned fiſh.

Again, Linnæus has taught him to remark the ſituation of the fins: for the ventral or belly fins, which are thoſe particularly to be remarked, are either wholly wanting, as in the eel, and then the fiſh is called *Apodal* (a Greek word ſignifying without feet); or the ventral fins are placed more forward than the pectoral fins, as in the haddock, and then the animal is called a *Jugular* fiſh; or the ventral fins are placed directly under the pectoral fins, as in the father-laſher, and then it is called a *Thoracic* fiſh: or, laſtly, the ventral fins are placed

nearer the tail than the pectoral fins, as in the minow, and then it is an *Abdominal* fish.

Poſſeſſed of theſe diſtributions, the French naturaliſt mixes and unites them into two grand diviſions. All the prickly finned fiſh make one general diviſion; all the ſoft finned fiſh another. Theſe firſt are diſtinguiſhed from each other, as being either *apodal*, *jugular*, *thoracic* or *abdominal*. Thus there are prickly finned *apodal* fiſhes; prickly finned *jugular* fiſhes, prickly finned *thoracic* fiſhes, and prickly finned *abdominal* fiſhes. On the other hand, the ſoft finned fiſhes fall under a ſimilar diſtribution, and make the other general diviſion. Thus there are ſoft finned *apodal* fiſhes, ſoft finned *jugular* fiſhes, ſoft finned *thoracic* fiſhes, and ſoft finned *abdominal* fiſhes. Theſe general characters are ſtrongly marked, and eaſily remembered. It only remains, therefore, to divide theſe into ſuch tribes as are moſt ſtrongly marked by nature; and to give the diſtinct characters of each, to form a complete ſyſtem with great ſimplicity. This Mr. Gouan has done; and the tribes into which he has diſtributed each of theſe diviſions, exactly amount to fifty. Thus the reader, who can contain in his memory the characteriſtic marks of fifty kinds, will have a tolerable idea of the form of every kind of ſpinous fiſh. I ſay, of the form; for

as to the hiſtory and the nature of the animal itſelf, that can only be obtained by experience and information.

## PRICKLY FINNED FISHES.

### Prickly Finned Apodal Fish.

1. THE *Trichurus.* The body of a ſword-form; the head oblong; the teeth ſword-like, bearded near the points; the fore teeth largeſt; the fin that covers the gills with ſeven ſpines; the tail ending in a point without fins; an inhabitant near the Oriental and American ſhores; of a ſilvery white; frequently leaping into the fiſhermen's boats in China.

2. The *Xiphias* or *Sword-fiſh.* The body round; the head long; the upper-jaw terminating by a long beak, in form of a ſword; the fin that covers the gills with ſix ſpines; an inhabitant of Europe; an enemy to the whale.

3. The *Ophidium* or *Gilthead.* The body ſword-like; the head blunt; the fin covering the gills with ſeven ſpines; the opening of the mouth ſide-ways; the fins of the back, the anus, and the tail all joining together; the moſt beautiful of all fiſhes, covered over with green, gold, and ſilver; it is by ſailors

called the dolphin, and gives chace to the flying-fiſh.

### Prickly Finned Jugular Fish.

4. The *Trachinus* or *Weever*. The body oblong; the head obtuſe; the bones covering the gills jagged at the bottom; the fins covering the gills with ſix ſpines; the anus near the breaſt; buries itſelf in the ſands, leaving only its noſe out; and if trod, immediately ſtrikes with the ſpines that form its dorſal fins, which are venomous and dangerous.

5. The *Uranoſcopus*. The body wedge-like; the head almoſt round, and larger than the body; the mouth flat; the eyes on the top of the head; the fin covering the gills with five ſpines; the anus in the middle of the body; an inhabitant of the Mediterranean Sea.

6. The *Callyonymus* or *Dragonet*. The body almoſt wedge-like; the head broad, and larger than the body; the mouth even with the body; the bony covering of the gills cloſe ſhut; the opening to the gills behind the head; the fin covering the gills with ſix ſpines; an inhabitant of the Atlantic Ocean.

7. The *Blennius* or *Blenny*. The body oblong; the head obtuſely bevil; the teeth a ſingle

range; the fin covering the gills with ſix ſpines; the ventral fins have two ſmall blunt bones in each; a ſpecies of this animal is viviparous.

## Prickly Finned Thoracic Fishes.

8. The *Gobius* or *Gudgeon*. The body round and oblong; the head with two little holes between the eyes, one before the other; the fin covering the gills with ſix ſpines; the ventral fins joined together.

9. The *Cepola*. The body ſword-like; the head blunt; the mouth flat; the fin covering the gills with ſix ſpines; the fins diſtinct; an inhabitant of the Mediterranean Sea.

10. The *Coryphæna* or *Razor-fiſh*. The body wedge-like; the head very bevil; the fin covering the gills with five ſpines.

11. The *Scomber* or *Mackarel*. The body oblong; the line running down the ſide zigzagged towards the tail; the head ſharp and ſmall; the fins covering the gills with ſix ſpines; ſeveral falſe fins towards the tail.

12. The *Labrus* or *Wraſſe*. The body oval; the head middling; the lips doubled inward; both cutting and grinding teeth; the covers

of the gills ſcaly; the fin covering the gills with five ſpines; the pectoral fins pointed.

13. The *Sparus* or *Sea-bream.* The body oblong; the head middling; the lips not inverted; the teeth cutting and grinding; the cover of the gills ſcaly; the fins covering the gills with five rays; the pectoral fins pointed.

14. The *Chætodon* or *Cat-fiſh.* The body oblong; the head ſmall; the teeth ſlender and bending; the fin covering the gills with five or ſix ſpines; the fins of the back and anus ſcaly.

15. The *Sciæna.* The body nearly eliptical; the head bevil; the covers of the fins ſcaly; the fin covering the gills with ſix rays; the fins of the back jagged, and hidden in a furrow in the back.

16. The *Perch.* The body oblong; the head bevil; the covers of the gills ſcaly and toothed; the fin covering the gills with ſeven ſpines; the fins in ſome jagged.

17. The *Scorpæna* or *Father-laſher.* The body oblong; the head great, with beards; the covers of the gills armed with prickles; the fin covering the gills with ſeven ſpines.

18. The *Mullus* or *Surmu'et.* The body ſlender; the head almoſt four-cornered; the fin covering the gills with three ſpines; ſome of theſe have beards; a fiſh highly prized by the

Romans, and ſtill conſidered as a very great delicacy.

19. The *Trigla* or the *Gurnard.* The body ſlender; the head nearly four-cornered, and covered with a bony coat; the fin covering the gills with ſeven ſpines; the pectoral and ventral fins, ſtrengthened with additional muſcles and bones, and very large for the animal's ſize.

20. The *Cottus* or *Bull-head.* The body wedge-like; the head flat and broader than the body; the fin covering the gills with ſix ſpines; the head furniſhed with prickles, knobs, and beards.

21. The *Zeus* or *Doree.* The body oblong; the head large, bevil; the fin covering the gills with ſeven rays; the fins jagged; the upper-jaw with a looſe floating ſkin depending into the mouth.

22. The *Thrachipterus* or *Sabre.* The body ſword-like; the head bevil; the fin covering the gills with ſix ſpines; the lateral line ſtraight; the ſcales in a ſingle order; a looſe ſkin in both the jaws.

23. The *Gaſteroſteus* or *Stickleback.* The body broadeſt towards the tail; the head oblong; the fin covering the gills with three ſpines; prickles ſtarting backward before the back fins and the fins of the anus.

## Prickly Finned Abdominal Fish.

24. The *Silurus* or *Sheat Fiſh*. The body oblong; the head large; the fin covering the gills from four to fourteen ſpines; the leading bones or ſpines in the back and pectoral fins toothed.

25. The *Mugil* or *Mullet*. The body oblong; the head almoſt conical; the upper jaw with a furrow, which receives the prominence of the under; the fin covering the gills with ſeven rays.

26. The *Polynemus*. The body oblong; the head with a beak; the fin covering the gills with from five to ſeven ſpines; the bones that move the pectoral fins not articulated to thoſe fins.

27. The *Theutys*. The body almoſt eliptical; the head abruptly ſhortened; the fin covering the gills with five rays; the teeth in a ſingle row, cloſe, ſtrong, and even.

28. The *Elops* or *Sea-ſerpent*. The body ſlender; the head large; the fin covering the gills double with thirty ſpines, and armed externally with five bones reſembling teeth.

## SOFT FINNED FISHES.

### Soft Finned Apodal Fishes.

29. THE *Muræna* or *Eel.* The body round and ſlender; the head terminating in a beak; the fin covering the gills with ten rays; the opening to the gills pipe faſhion, placed near the pectoral fins; the fins of the back, the anus, and the tail, united in one.

30. The *Gymnotus* or *Carapo.* The body broadeſt on the back, like the blade of a knife; the head ſmall; the fin covering the gills with five rays; the back without a fin; two beards or filaments from the upper lip; an inhabitant of Braſil.

31. The *Anarhicas* or *Wolf-fiſh.* The body roundiſh and ſlender; the head large and blunt; the fore-teeth above and below conical; the grinding-teeth and thoſe in the palate round; the fin covering the gill has ſix rays.

32. The *Stromateus.* The body oblong; the head ſmall; the teeth moderately ſharp; the fin covering the gills with five or ſix rays.

33. The *Ammodytes* or *Launce.* The body ſlender and roundiſh; the head terminated by a beak; the teeth of a hair-like fineneſs; the fin covering the gills with ſeven rays.

## Soft Finned Jugular Fishes.

34. The *Lepadogaſter*. The body wedge-like; the head oblong, forwarder than the body, flattiſh, the beak reſembling that of a duck; the pectoral fins double, two on each ſide; the ventral fins joined together; a kind of bony breaſt-plate between the pectoral fins; the fin covering the gills with five rays; the opening to the gills pipe-faſhion.

35. The *Gadus* or *Cod-fiſh*. The body oblong; the head wedge-like; the fin covering the gills with ſeven rays; ſeveral back and anal fins.

## Soft Finned Thoracic Fishes.

36. The *Plemonecles* or *Flumide*. The body eliptical; the head ſmall; both eyes on one ſide of the head; the fin covering the gills with from four to ſeven rays.

37. The *Echeneis* or *Sucking-fiſh*. The body almoſt wedge like, moderately round; the head broader than the body; the fin covering the gills with ten rays; an oval breaſt plate, ſtreaked in form of a ladder, toothed.

38. The *Lipidopus* or the *Garter-fiſh*. The

body ſword like; the head lengthened out; the fins covering the gills with ſeven rays; three ſcales only on the whole body; two in the place of the ventral fins; the third from that of the anus.

## Soft Finned Abdominal Fish.

39. The *Loricaria*. The body cruſted over; the head broad with a beak; no teeth; the fin covering the gills with ſix rays.

40. The *Atherina* or *Atherine*. The body oblong; the head of a middling ſize; the lips indented; the fin covering the gills with ſix rays; the line on the ſides reſembling a ſilver band.

41. The *Salmo* or *Salmon*. The body oblong; the head a little ſharp; the fin covering the gills from four to ten rays; the laſt fin on the back, without its correſpondent muſcles, fat.

42. The *Fiſtularia*. The body angular, in form of a ſpindle; the head pipe-faſhion, with a beak; the fin covering the gills with ſeven rays; the under-jaw covering the upper.

43. The *Eſox* or *Pike*. The body round; the head with a beak; the under-jaw pierced longitudinally with ſmall holes; the fin covering the gills with from ſeven to twelve rays.

44. The *Argentina* or *Argentine*. The body a little round and ſlender; the head with a beak, broader than the body; the fin covering the gills with eight rays; a ſpurious back fin.

45. The *Clupea* or *Herring*. The body a little oblong; the head with a ſmall beak; the fin covering the gills with eight rays.

46. The *Exocetas* or *Flying-fiſh*. The body oblong; the head almoſt three-cornered; the fin covering the gills with ten rays; the pectoral fins placed high, and as long as the whole body; the back fin at the extremity of the back.

47. The *Cyprinus* or *Carp*. The body elongated, almoſt round; the head with a ſmall beak; the hinder part of the bone covering the gills, marked with a creſcent; the fin covering the gills with three rays.

48. The *Cobitis* or *Loach*. The body oblong; almoſt equally broad throughout; the head ſmall, a little elongated; the eyes in the hinder part of the head; the fin covering the gills from four to ſix rays; the covers of the gills cloſed below.

49. The *Amia* or *Bonito*. The body round and ſlender; the head, forehead, and breaſt, without ſkin; the fin covering the gills with twelve rays; two beards from the noſe.

50. The *Mormyrus*. The body oblong; the head elongated; the fin covering the gills with a ſingle ray; the opening to the gills is linear, and has no bone covering them.

Such is the ſyſtem of Mr Gouan; by reducing to which any fiſh that offers, we can know its rank, its affinities, and partly its anatomy, all which make a conſiderable part in its natural hiſtory. But, to ſhew the uſe of this ſyſtem ſtill more apparently, ſuppoſe I meet with a fiſh, the name to me unknown, of which I deſire to know ſomething more. The way is firſt to ſee whether it be a cartilaginous fiſh, which may be known by its wanting fins to open and ſhut the gills, which the cartilaginous kinds are wholly without. If I find that it has them, then it is a ſpinous fiſh; and, in order to know its kind, I examine its fins, whether they be prickly or ſoft: I find them ſoft; it is therefore to be ranked among the ſoft finned fiſhes. I then examine its ventral or belly fins, and finding that the fiſh has them, I look for their ſituation, and find they lie nearer to the tail than the pectoral fins. By this I find the animal to be a ſoft finned abdominal fiſh. Then, to know which of the kinds of theſe fiſhes it is, I examine its figure and the ſhape of its head, I find the body rather oblong; the head with a

ſmall beak; the lower jaw like a ſaw; the fin covering the gills with eight rays. This animal muſt therefore be the herring, or one of that family, ſuch as the pilchard, the ſprat, the ſhad, or the anchovy. To give another inſtance: Upon examining the fins of a fiſh to me unknown, I find them prickly; I then look for the ſituation of the ventral fins, I find them entirely wanting; this then muſt be a prickly finned apodal fiſh. Of this kind there are but three; and by comparing the fiſh with the deſcription, I find it either of the trichurus kind, the ſword-fiſh, or the gilt head. Upon examining alſo its internal ſtructure, I ſhall find a very great ſimilitude between my fiſh and that placed at the head of the family.

CHAP.

## CHAP. II.

### Of Spinous Fiſhes in General.

HAVING given a method by which ſpinous fiſhes may be diſtinguiſhed from each other, the hiſtory of each in particular might naturally be expected to follow: but ſuch a diſtinct account of each would be very diſguſting, from the unavoidable uniformity of every deſcription. The hiſtory of any one of this claſs very much reſembles that of all the reſt: they breathe air and water through the gills; they live by rapine, each devouring ſuch animals as its mouth is capable of admitting; and they propagate, not by bringing forth their young alive, as in the cetaceous tribes, nor by diſtinct eggs, as in the generality of the cartilaginous tribes, but by ſpawn, or peas, as they are generally called, which they produce by hundreds of thouſands. Theſe are the leading marks that run through their whole hiſtory, and which have ſo much ſwelled books with tireſome repetition.

It will be ſufficient therefore to draw this numerous claſs into one point of view, and to mark how they differ from the former claſſes; and what they poſſeſs peculiarly ſtriking, ſo as

to diſtinguiſh them from each other. The firſt object that preſents itſelf, and that by which they differ from all others, are the bones. Theſe, when examined but ſlightly, appear to be entirely ſolid; yet, when viewed more cloſely, every bone will be found hollow, and filled with a ſubſtance leſs rancid and oily than marrow. Theſe bones are very numerous, and pointed; and, as in quadrupedes, are the props or ſtays to which the muſcles are fixed which move the different parts of the body.

The number of bones in all ſpinous fiſhes of the ſame kind, is always the ſame. It is a vulgar way of ſpeaking to ſay, that fiſhes are at ſome ſeaſons more bony than at others; but this ſcarce requires contradiction. It is true indeed, that fiſh are at ſome ſeaſons much fatter than at others; ſo that the quantity of the fleſh being diminiſhed, and that of the bones remaining the ſame, they appear to encreaſe in number, as they actually bear a greater proportion.

All fiſh of the ſame kind, as was ſaid, have the ſame number of bones: the ſkeleton of a fiſh, however irregularly the bones may fall in our way at table, has its members very regularly diſpoſed; and every bone has its fixed place, with as much preciſion as we find in the orders of a regular fabric. But then ſpinous fiſh differ

in the number of bones according to the ſpecies; for ſome have a greater number of fins by which they move in the water. The number in each is always in proportion to the number and ſize of theſe fins: for every fiſh has a regular apparatus of bones and muſcles, by which the fins are moved; and all thoſe fiſh where they are numerous or large, muſt, of conſequence, be conſiderably bony. Indeed, in the larger fiſh, the quantity of fleſh is ſo much, and the bones themſelves are ſo large, that they are eaſily ſeen and ſeparated: but in the ſmaller kinds with many fins, the bones are as numerous as in the great; yet being ſo very minute, they lurk almoſt in every part of the fleſh, and are dangerous as well as troubleſome to be eaten. In a word, thoſe fiſh which are large, fat, and have few fins, are found to be the leaſt bony; thoſe which are ſmall, lean, and have many fins, are the moſt bony of all others. Thus, for inſtance, a roach appears more bony than a carp, becauſe it is leaner and ſmaller; and it is actually more bony than an eel, becauſe it has a greater number of fins.

As the ſpinous fiſh partake leſs of the quadrupede in their formation than any others, ſo they can bear to live out of their own element a ſhorter time. In general, when taken out of

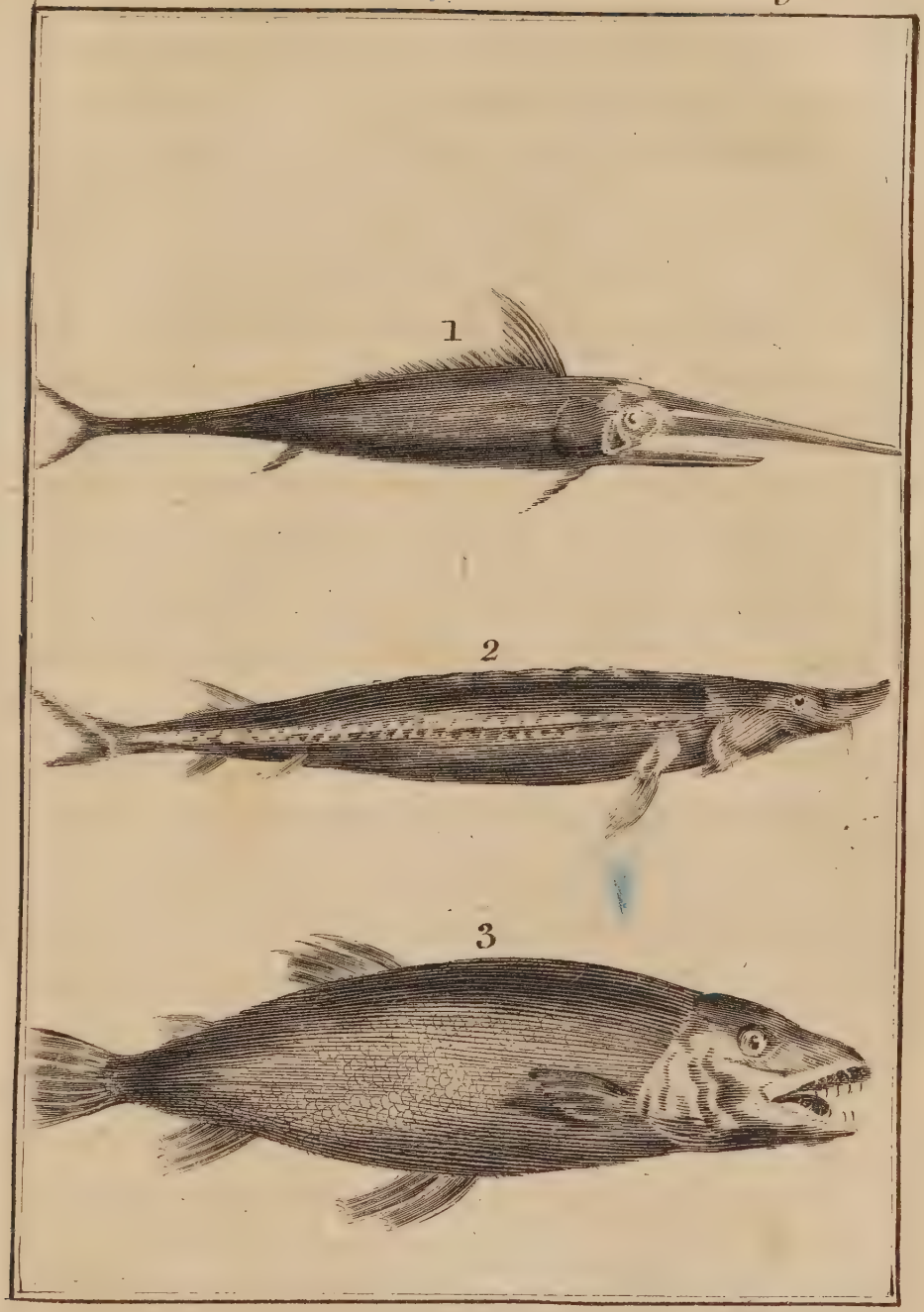
the water, they teſtify their change by panting more violently and at cloſer intervals, the thin air not furniſhing their gills the proper play; and in a few minutes they expire. Some indeed are more vivacious in air than others; the eel will live ſeveral hours out of water; and the carp has been known to be fattened in a damp cellar. The method is by placing it in a net well wrapped up in wet moſs, the mouth only out, and then hung up in a vault. The fiſh is fed with white bread and milk; and the net now and then plunged into the water. The animal, thus managed, has been known not only to live for a fortnight, but to grow exceedingly fat, and of a ſuperior flavour. From this it would ſeem, that the want of moiſture in the gills, is the chief cauſe of the death of theſe animals; and could that be ſupplied, their lives might be prolonged in the air, almoſt as well as in their own element.

Yet it is impoſſible to account for the different operations of the ſame element, upon animals, that, to appearance, have the ſame conformation. To ſome fiſhes, bred in the ſea, freſh water is immediate deſtruction: on the other hand, ſome fiſhes, that live in our lakes and ponds, cannot bear the ſalt water. Whence this difference can ariſe, is not eaſy to be accounted

for. The ſaline quality of the water cannot properly be given as the cauſe; ſince no fiſhes imbibe any of the ſea's ſaltneſs with their food, or in reſpiration. The fleſh of all fiſhes is equally freſh, both in the river, and at the ſalteſt depths of the ocean; the ſalt of the element in which they live, no way mixing with their conſtitution. Whence then is it that animals will live only there; and will quickly expire, when carried into freſh water? It may probably ariſe from the ſuperior weight of the ſea-water. As from the great quantity of ſalt diſſolved in its compoſition, it is much heavier than freſh water, ſo it is probable it lies with greater force upon the organs of reſpiration, and gives them their proper and neceſſary play: on the other hand, thoſe fiſh which are uſed only to freſh water, cannot bear the weight of the ſaline fluid, and expire in a manner ſuffocated in the groſsneſs of the ſtrange element.

But though there are ſome tribes that live only in the ſea, and others only in freſh water, yet there are ſome whoſe organs are equally adapted to either element; and that ſpend a part of their ſeaſon in one, and a part in the other. Thus the ſalmon, the ſhad, the ſmelt, and the flounder, annually quit their native ocean, and come up our rivers to depoſite their

ſpawn. This ſeems the moſt important buſineſs of their lives; and there is no danger which they will not encounter, even to the ſurmounting precipices, to find a proper place for the depoſition of their future offspring. The ſalmon, upon theſe occaſions, is ſeen to aſcend rivers five hundred miles from the ſea; and to brave not only the danger of various enemies, but alſo to ſpring up cataracts as high as a houſe. As ſoon as they come to the bottom of the torrent, they ſeem diſappointed to meet the obſtruction, and ſwim ſome paces back: they then take a view of the danger that lies before them, ſurvey it motionleſs for ſome minutes, advance, and again retreat; till at laſt ſummoning up all their force, they take a leap from the bottom, their body ſtraight, and ſtrongly in motion; and thus moſt frequently clear every obſtruction. It ſometimes happens, however, that they want ſtrength to make the leap; and then, in our fiſheries, they are taken in their deſcent. But this is one of the ſmalleſt dangers that attend theſe adventuring animals in their progreſs: numberleſs are the methods of taking them; as well by the hook, as by nets, baſkets, and other inventions, which it is not our buſineſs here to deſcribe. Their capture makes, in ſeveral countries, a great article of commerce; and being cured in ſeveral different




E. Martin sculp.

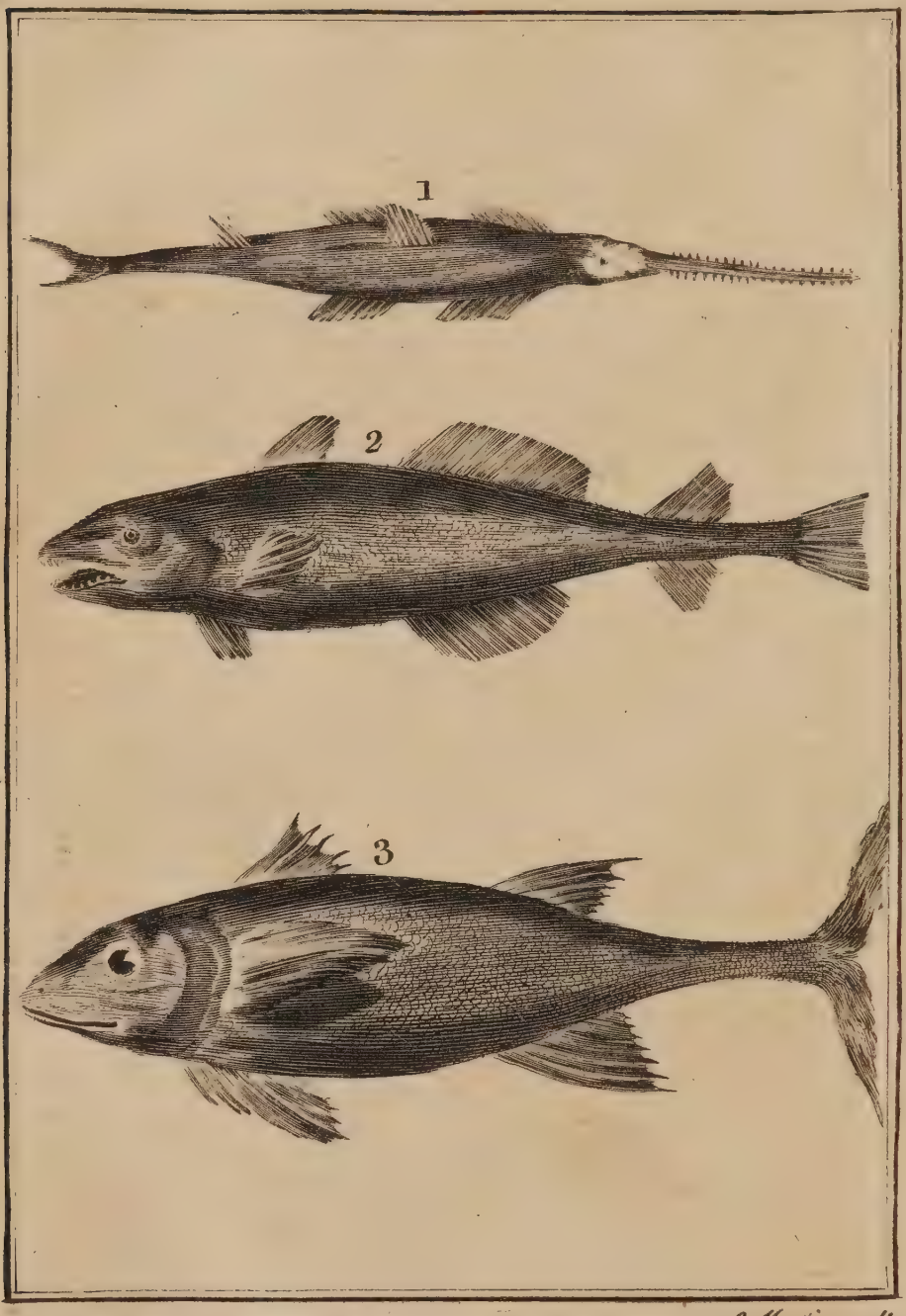
1. The Sword Fish.
2. The Sturgeon.
3. A Salmon.

manners, either by ſalting, pickling, or drying, they are ſent to all the markets of Europe.

As theſe mount up the rivers to depoſite their ſpawn, others, particularly the eel, deſcend the freſh water ſtream, as Redi aſſures us, to bring forth their young in the ſea. About the month of Auguſt, annually, theſe animals take the opportunity of the moſt obſcure nights, and when the rivers are flooded by accidental rains, ſeek the ocean. When they have reached the ſea, and produced their young, for they are viviparous, they again aſcend the ſtream, at different times, as opportunity offers, or as the ſeaſon is favourable or tempeſtuous. Their paſſage begins uſually about the end of January, and continues till towards the end of May, when they are taken in the river Arno by millions, and ſo ſmall that a thouſand of them goes to a pound. There is nothing more certain than, that they deſcend in our own rivers after floods, in great abundance, and are thus caught in nets, to very great advantage. They are poſſeſſed alſo of a power of climbing over any obſtacle; for, by applying their glutinous and ſlimy bodies to the ſurface of the object they deſire to ſurmount, they can thus creep up locks, weirs, and every thing that would prevent their aſcending the current of the ſtream.

But the length of the voyage performed by theſe fiſhes, is ſport, if compared to what is annually undertaken by ſome tribes, that conſtantly reſide in the ocean. Theſe are known to take a courſe of three or four thouſand miles in a ſeaſon; ſerving for prey to whales, ſharks, and the numerous flocks of water-fowl, that regularly wait to intercept their progreſs. Theſe may be called fiſh of paſſage, and bear a ſtrong analogy to birds of paſſage, both from their ſocial diſpoſition, and the immenſity of their numbers. Of this kind are the cod, the haddock, the whiting, the mackrel, the tunny, the herring, and the pilchard. Other fiſh live in our vicinity, and reſide on our coaſts all the year round; or keep in the depths of the ocean, and are but ſeldom ſeen: but theſe, at ſtated ſeaſons, viſit their accuſtomed haunts with regular certainty, generally returning the ſame week in the ſucceeding year, and often the ſame day.

The ſtated returns, and the regular progreſs of theſe fiſh of paſſage, is one of the moſt extraordinary circumſtances in all the hiſtory of nature. What it is that impels them to ſuch diſtant voyages; what directs their paſſage; what ſupports them by the way; and what ſometimes prompts them to quit, for ſeveral ſeaſons, one ſhore for another, and then return




*E. Martin sculp.*

1. The Saw Fish.
2. The Cod Fish.
3. The Tunny.

to their accuſtomed harbour; are queſtions that curioſity may aſk, but philoſophy can hardly reſolve. We muſt diſmiſs enquiry, ſatisfied with the certainty of the facts.

The cod ſeems to be the foremoſt of this wandering tribe; and is only found in our northern part of the world. This animal's chief place of reſort is on the banks of Newfoundland, and the other ſand banks that lie off Cape-Breton. That extenſive flat ſeems to be no other than the broad top of a ſea-mountain, extending for above five hundred miles long, and ſurrounded with a deeper ſea. Hither the cod annually repair in numbers beyond the power of calculation, to feed on the quantity of worms that are to be found there in the ſandy bottom. Here they are taken in ſuch quantities, that they ſupply all Europe with a conſiderable ſhare of proviſion. The Engliſh have ſtages erected all along the ſhore for ſalting and drying them; and the fiſhermen, who take them with the hook and line, which is their method, draw them in as faſt as they can throw out. This immenſe capture, however, makes but a very ſmall diminution, when compared to their numbers; and when their proviſion there is exhauſted, or the ſeaſon for propagation returns, they go off to the polar ſeas, where they depo-

ſite their roes in full ſecurity. From thence want of food forces them, as ſoon as the firſt more ſouthern ſeas are open, to repair ſouthward for ſubſiſtence. Nor is this fiſh an unfrequent viſitant upon our own ſhores: but the returns are not ſo regular, nor does the capture bear any proportion to that at Newfoundland.

The haddock, the whiting, and the mackrel, are thought, by ſome, to be driven upon our coaſts rather by their fears than their appetites; and it is to the purſuit of larger fiſhes, we owe their welcome viſits. It is much more probable, that they come for that food which is found in more plenty near the ſhore, than farther out at ſea. One thing is remarkable, that their migrations ſeem to be regularly conducted. The grand ſhoal of haddocks that comes periodically on the Yorkſhire coaſts, appeared there in a body on the tenth of December, 1766; and exactly on the ſame day, in the following year. This ſhoal extended from the ſhore near three miles in breadth, and in length for more than forty. The limits of a ſhoal are preciſely known; for if the fiſhermen put down their lines at the diſtance of more than three miles from ſhore, they catch nothing but dog fiſh: a proof that the haddock is not there.

But of all migrating fiſh, the herring and the pilchard take the moſt adventurous voyages.

Herrings are found in the greateſt abundance in the higheſt northern latitudes. In thoſe inacceſſible ſeas, that are covered with ice for a great part of the year, the herring and pilchard find a quiet and ſure retreat from all their numerous enemies: thither neither man, nor their ſtill more deſtructive enemy, the fin-fiſh, or the cachalot, dares to purſue them. The quantity of inſect food which thoſe ſeas ſupply, is very great; whence, in that remote ſituation, defended by the icy rigour of the climate, they live at eaſe, and multiply beyond expreſſion. From this moſt deſirable retreat, Anderſon ſuppoſes, they would never depart, but that their numbers render it neceſſary for them to migrate; and, as with bees from a hive, they are compelled to ſeek for other retreats.

For this reaſon, the great colony is ſeen to ſet out from the icy ſea about the middle of winter; compoſed of numbers, that if all the men in the world were to be loaded with herrings, they would not carry the thouſandth part away. But they no ſooner leave their retreats, but millions of enemies appear to thin their ſquadrons. The fin-fiſh and the cachalot ſwallow barrels at a yawn; the porpus, the grampus, the ſhark, and the whole numerous tribe of dog-fiſh, find them an eaſy prey, and

deſiſt from making war upon each other: but ſtill more, the unnumbered flocks of ſea-fowl that chiefly inhabit near the pole, watch the outſet of their dangerous migration, and ſpread extenſive ruin.

In this exigence, the defenceleſs emigrants find no other ſafety but by crouding cloſer together, and leaving to the outmoſt bands the danger of being the firſt devoured; thus, like ſheep when frighted, that always run together in a body, and each finding ſome protection in being but one of many that are equally liable to invaſion, they are ſeen to ſeparate into ſhoals, one body of which moves to the weſt, and pours down along the coaſts of America, as far ſouth as Carolina, and but ſeldom farther. In Cheſepeak Bay, the annual inundation of theſe fiſh is ſo great, that they cover the ſhores in ſuch quantites as to become a nuiſance. Thoſe that hold more to the eaſt, and come down towards Europe, endeavour to ſave themſelves from their mercileſs purſuers, by approaching the firſt ſhore they can find; and that which firſt offers in their deſcent, is the coaſt of Iceland, in the beginning of March. Upon their arrival on that coaſt, their phalanx, which has already ſuffered conſiderable diminutions, is nevertheleſs of amazing extent, depth, and cloſeneſs, covering

an extent of ſhore as large as the iſland itſelf. The whole water ſeems alive; and is ſeen ſo black with them to a great diſtance, that the number ſeems inexhauſtible. There the porpeſs and the ſhark continue their depredations; and the birds devour what quantities they pleaſe. By theſe enemies the herrings are cooped up into ſo cloſe a body, that a ſhovel, or any hollow veſſel put into the water, takes them up without farther trouble.

That body which comes upon our coaſts, begins to appear off the Shetland Iſles in April. Theſe are the forerunners of the grand ſhoal which deſcends in June; while its arrival is eaſily announced, by the number of its greedy attendants, the gannet, the gull, the ſhark and the porpeſs. When the main body is arrived, its breadth and depth is ſuch as to alter the very appearance of the ocean. It is divided into diſtinct columns, of five or ſix miles in length, and three or four broad; while the water before them curls up, as if forced out of its bed. Sometimes they ſink for the ſpace of ten or fifteen minutes, then riſe again to the ſurface; and, in bright weather, reflect a variety of ſplendid colours, like a field beſpangled with purple, gold and azure. The fiſhermen are ready prepared to give them a proper recep-

tion; and, by nets made for the occaſion, they take ſometimes above two thouſand barrels at a ſingle draught.

From the Shetland Iſles, another body of this great army, where it divides, goes off to the weſtern coaſts of Ireland, where they meet with a ſecond neceſſity of dividing. The one takes to the Atlantic, where it is ſoon loſt in that extenſive ocean; the other paſſes into the Iriſh ſea, and furniſhes a very conſiderable capture to the natives.

In this manner, the herrings expelled from their native ſeas, ſeek thoſe bays and ſhores where they can find food, and the beſt defence againſt their unmerciful purſuers of the deep. In general, the moſt inhabited ſhores are the places where the larger animals of the deep are leaſt fond of purſuing; and theſe are choſen by the herring as an aſylum from greater dangers. Thus, along the coaſts of Norway, the German ſhores, and the northern ſhores of France, theſe animals are found punctual in their viſitations. In theſe different places they produce their young; which, when come to ſome degree of maturity, attend the general motions. After the deſtruction of ſuch numbers, the quantity that attempts to return is but ſmall; and Anderſon doubts whether they ever return.

Such is the account given of the migration of theſe fiſhes, by one who, of all others, was beſt acquainted with their hiſtory; and yet many doubts ariſe, in every part of the migration. The moſt obvious which has been made is, that though ſuch numbers periſh in their deſcent from the north, yet, in compariſon to thoſe that ſurvive, the account is trifling: and it is ſuppoſed, that of thoſe taken by man, the proportion is not one to a million. Their regularly leaving the ſhore alſo at a ſtated time, would imply that they are not in theſe viſits under the impulſe of neceſſity. In fact, there ſeems one circumſtance that ſhews theſe animals governed by a choice with reſpect to the ſhores they pitch upon; and not blindly drove from one ſhore to another. What I mean is, their fixing upon ſome ſhores for ſeveral ſeaſons, or indeed, for ſeveral ages together; and, after having regularly viſited them every year, then capriciouſly forſaking them, never more to return. The firſt great bank for herrings was along the ſhores of Norway. Before the year 1584, the number of ſhips from all parts of Europe that reſorted to that ſhore, exceeded ſome thouſands. The quantity of herrings that were then aſſembled there, was ſuch, that a man who ſhould put a ſpear in the water, as Olaus Magnus aſſerts, would ſee it

ſtand on end, being prevented from falling. But ſoon after that period, theſe animals were ſeen to deſert the Norway ſhores, and took up along the German coaſt, where the Hanſe-towns drove a very great trade by their capture and ſale; but, for above a century, the herrings have, in a great meaſure, forſaken them; and their greateſt colonies are ſeen in the Britiſh channel, and upon the Iriſh ſhores. It is not eaſy to aſſign a cauſe for this ſeemingly capricious deſertion: whether the number of their finny enemies encreaſing along the northern coaſts, may have terrified the herring tribe from their former places of reſort; or, whether the quantity of food being greater in the Britiſh channel, may not allure them thither, is not eaſy to determine!

The pilchard, which is a fiſh differing little from the herring, makes the coaſt of Cornwall its place of principal reſort. Their arrival on that coaſt is ſoon proclaimed by their attendants the birds, and the larger fiſhes; and the whole country prepare to take the advantage of this treaſure, providentially thrown before them. The natives ſometimes encloſe a bay of ſeveral miles extent with their nets called ſaines. To direct them in their operations, there were ſome years ago (but I believe they are diſcontinued) ſeveral

men placed on eminencies near the ſhore, called *huers*, who, with brooms in their hands, gave ſignals where the nets were to be extended, and where the ſhoals of fiſhes lay: this they perceived by the colour of the water, which aſſumed a tincture from the ſhoals beneath. By theſe means, they ſometimes take twelve or fifteen hundred barrels of pilchards at a draught; and they place them in heaps on the ſhore. It often happens, that the quantity caught exceeds the ſalt or the utenſils for curing them; and then they are carried off to ſerve for the purpoſes of manure. This fiſhery employs not only great numbers of men at ſea, training them to naval affairs, but alſo numbers of women and children at land, in ſalting and curing the fiſh; in making boats, nets, ropes and caſks, for the purpoſes of taking or fitting them for ſale. The poor are fed with the ſuperfluity of the capture; the land is manured with the offals: the merchant finds the gain of commiſſion, and honeſt commerce; the fiſherman a comfortable ſubſiſtence from his toil. "Ships," ſays Dr. Borlaſe, "are often freighted hither with ſalt, "and into foreign countries with the fiſh, car-"rying off at the ſame time a part of our tin. "The uſual produce of the number of hogſ-"heads exported for ten years, from 1747 to

" 1756 inclusive, amounted to near thirty " thousand hogsheads each year: every hogs- " head has amounted, upon an average, to the " price of one pound, thirteen shillings and " three-pence. Thus the money paid for pil- " chards exported, has annually amounted to " near fifty thousand pounds."

Whence these infinite numbers are derived, still remains obscure; but it will encrease our wonder to be told, that so small a fish as the stickleback, which is seldom above two inches long, and that one would think could easily find support in any water, is yet obliged to colonize, and leave its native fens in search of new habitations. Once every seventh or eighth year, amazing shoals of these appear in the river Welland, near Spalding, and come up the stream, forming one great column. They are supposed to be multitudes collected in some of the fens, till overcharged with numbers, they are periodically obliged to migrate. An idea may be had of their numbers, when we are informed, that a man, employed by a farmer to take them, for the purpose of manuring his grounds, has got, for a considerable time, four shillings a day, by selling them at a halfpenny a bushel!

Thus we see the amazing propagation of

fiſhes along our own coaſts and rivers; but their numbers bear no proportion to the vaſt quantities found among the iſlands of the Indian ocean. The inhabitants of theſe countries are not under the neceſſity even of providing inſtruments for fiſhing; it is but going down to the ſhore, and there the fiſh are found in great numbers in the plaſhes that ſtill continue to have water in them. In ſome of theſe places the quantity is ſo great, that they are left in ſhoals, on thoſe ſwamps, dried up by the ſun, and their putrefaction contributes to render the country unhealthful.

This power of encreaſing in theſe animals, exceeds our idea, as it would, in a very ſhort time, outſtrip all calculation. A ſingle herring, if ſuffered to multiply unmoleſted and undiminiſhed for twenty years, would ſhew a progeny greater in bulk than ten ſuch globes as that we live upon. But happily the balance of nature is exactly preſerved; and their conſumption is equal to their fecundity. For this reaſon we are to conſider the porpeſs, the ſhark, or the cod-fiſh, not in the light of plunderers and rivals, but of benefactors to mankind. Without their aſſiſtance, the ſea would ſoon become overcharged with the burthen of its own productions; and that element, which at

preſent diſtributes health and plenty to the ſhore, would but load it with putrefaction.

In the propagation of all fiſh ſome degree of warmth ſeems abſolutely neceſſary, not only to their preſervation, but to the advancement of their poſterity. Their ſpawn is always depoſited in thoſe places where the ſun-beams may reach them, either at the bottom of ſhallow ſhores, or floating on the ſurface in deeper waters. A ſmall degree of heat anſwers all the purpoſes of incubation, and the animal iſſues from the egg in its ſtate of perfect formation, never to undergo any ſucceeding change.

Yet ſtill, I have ſome doubts whether moſt fiſh come from the egg completely formed. We know that in all the frog tribe, and many of the lizard kind, they are produced from the egg in an imperfect form. The tadpole, or young frog, with its enormous head and ſlender tail, are well known; a ſpecies of the lizard alſo, which is excluded from the ſhell without legs, only acquires them by degrees, and not till after ſome time does it put off its ſerpent form. It is probable that ſome kinds of fiſh in like manner ſuffer a change; and though it be too inconſiderable to ſtrike the fiſherman or the inattentive ſpectator, yet it makes a very material difference to the naturaliſt, and would perhaps

diſarrange his moſt favourite ſyſtems. A ſlight alteration in the fins or bones that cover the gills would overturn the whole fabric of the moſt applauded ichthyologiſt; and yet, as I obſerved, it is moſt probable that theſe minute alterations often take place.

As a proof of this, during the month of July, there appear near Greenwich innumerable ſhoals of ſmall fiſhes, which are known to the Londoners by the name of White Bait. It is univerſally agreed that they are the young of ſome fiſh; they are never ſeen but at this time of the year, and never found to have any roe, a circumſtance that proves their not being come to maturity. The quantity is amazing; and the fiſh that produces them in ſuch numbers muſt be in plenty, though it is not yet known what that fiſh is, as they correſpond with no other ſpecies whatever. They moſt reſemble the ſmelt in form; and yet they want a fin, which that animal is never without. They cannot be the bleak, as they are never found in other rivers where the bleak breed in great abundance. It is moſt probable, therefore, that they are the young of ſome animal not yet come to their perfect form, and therefore reducible to no preſent ſyſtem.

The time that ſpinous fiſhes continue in the

pea is in proportion to the ſize of the kind. It is a rule that chiefly holds through nature, that the larger the animals are, the longer they continue before excluſion. This I ſay holds generally through all nature; though it is not eaſy to aſſign a cauſe for ſo well known a truth. It may probably be, that as all large bodies take a longer time to grow hot than ſmall ones, ſo the larger the egg, the longer influence of vital warmth it requires to reach through all its receſſes, and to unfold the dormant ſprings that wait to be put into motion.

The manner in which the eggs of fiſhes are impregnated is wholly unknown. All that obviouſly offers is, that in ponds the ſexes are often ſeen together among the long graſs at the edge of the water; that there they ſeem to ſtruggle; and that during this time they are in a ſtate of ſuffering; they grow thin; they loſe their appetite, and their fleſh becomes flabby; the ſcales of ſome grow rough, and they loſe their luſtre. On the contrary, when the time of coupling is over, their appetite returns; they re-aſſume their natural agility, and their ſcales become brilliant and beautiful.

Although the uſual way with ſpinous fiſhes is to produce by ſpawn; yet there are ſome, ſuch as the eel and the blenny, that are known to bring forth their young alive. Bowlker, who

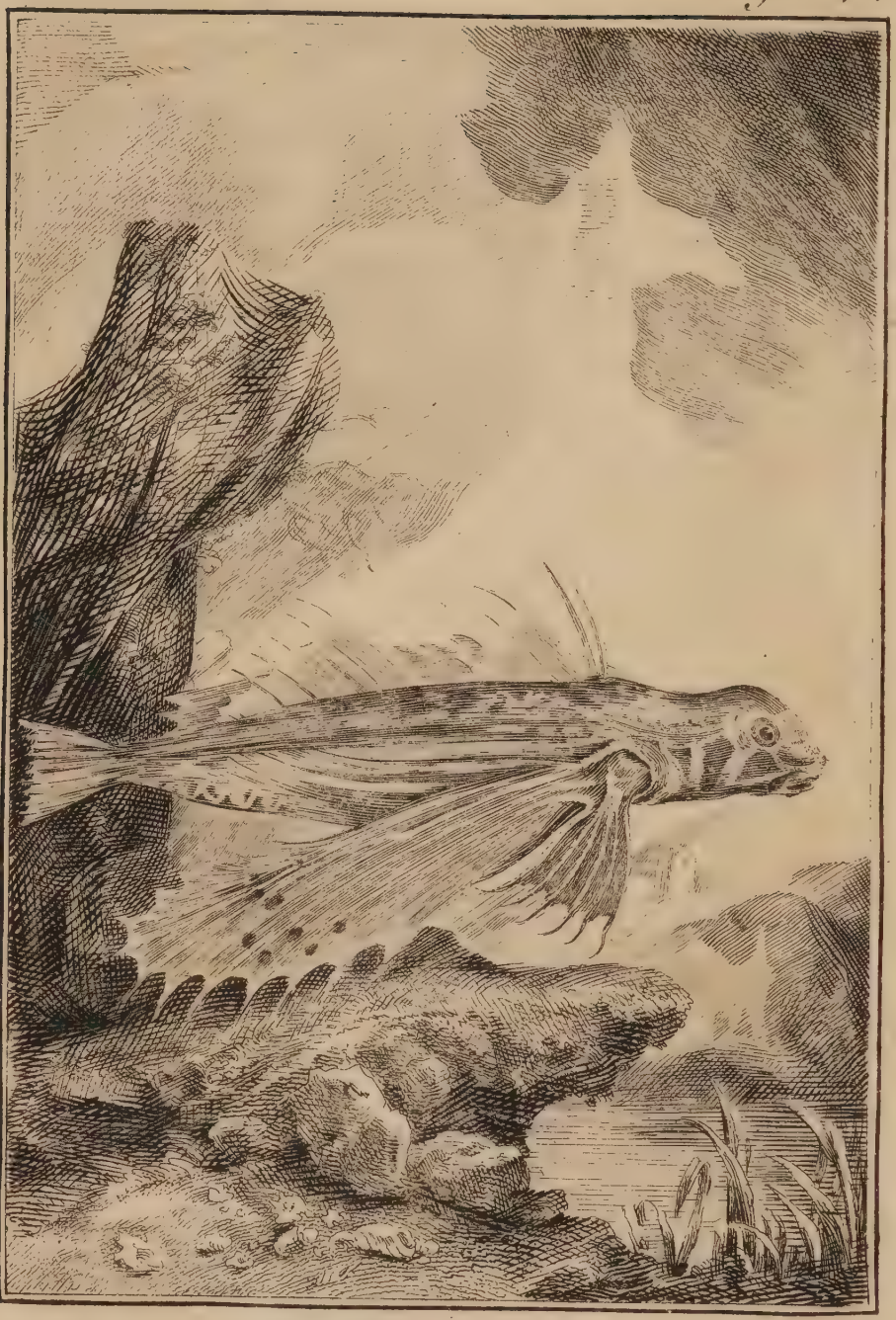
has written a treatiſe upon fiſhing, ſeems to determine the queſtion relative to the viviparous production of eels, upon the authority of one or two credible witneſſes. An eel, opened in the preſence of ſeveral perſons of credit, was found to have an infinite number of little creatures, cloſely wrapped up together in a lump, about the ſize of a nutmeg, which being put into a baſon of water, ſoon ſeparated, and ſwam about: yet ſtill, whether theſe may not have been worms generated in the animal's body, remains a doubt; for there are ſcarce any fiſhes that are not infeſted with worms in that manner.

With reſpect to the growth of fiſhes, it is obſerved, that among carps, particularly the firſt year, they grow to about the ſize of the leaf of a willow-tree; at two years, they are about four inches long. They grow but one inch more the third ſeaſon, which is five inches. Thoſe of four years old are about ſix inches; and ſeven after the fifth. From that to eight years old they are found to be large in proportion to the goodneſs of the pond, from eight to twelve inches. With regard to ſea-fiſh, the fiſhermen aſſure us that a fiſh muſt be ſix years old before it is fit to be ſerved up to table. They inſtance it in the growth of a mackarel.

They aſſure us that thoſe a year old are as large as one's finger; that thoſe of two years, are about twice that length; at three and four years, they are that ſmall kind of mackarel that have neither melts nor rows; and between five and ſix, they are thoſe full grown fiſh that are ſerved up to our tables. In the ſame manner, with regard to flat fiſhes, they tell us that the turbot and barble at one year are about the ſize of a crown piece; the ſecond year as large as the palm of one's hand; and at the fifth and ſixth year, they are large enough to be ſerved up to table. Thus it appears that fiſh are a conſiderable time in coming to their full growth, and that they are a long time deſtroyed before it comes to their turn to be deſtroyers *.

All fiſh live upon each other, in ſome ſtate of their exiſtence. Thoſe with the largeſt mouths, attack and devour the larger kinds; thoſe whoſe mouths are leſs, lie in wait for the ſmaller fry; and even theſe chiefly ſubſiſt upon ſpawn. Of thoſe which live in the ocean of the ſpinous kinds, the Dorado is the moſt voracious. This is chiefly found in the tropical climates; and is at once the moſt active, and the moſt beautiful of the

* Traité des Pêche par Monſieur Duhamel. Sect. 3, p. 100.



The Flying Fish. C. Martin sculp.

finny region. It is about ſix feet long; the back all over enamelled with ſpots of a bluiſh green and ſilver; the tail and fins of a gold colour; and all have a brilliancy of tint, that nothing but Nature's pencil can attain to: the eyes are placed on each ſide of the head, large and beautiful, ſurrounded with circles of ſhining gold. In the ſeas where they are found, theſe fiſh are always in motion, and play round ſhips in full ſail, with eaſe and ſecurity: for ever either purſuing or purſued, they are ſeen continually in a ſtate of warfare; either defending themſelves againſt the ſhark, or darting after the ſmaller fiſhes. Of all others, the Flying-fiſh moſt abounds in theſe ſeas; and as it is a ſmall animal, ſeldom growing above the ſize of a herring, it is chiefly ſought by the dorado. Nature has furniſhed each reſpectively with the powers of purſuit and evaſion. The dorado being above ſix feet long, yet not thicker than a ſalmon, and furniſhed with a full complement of fins, cuts its way through the water with amazing rapidity: on the other hand, the flying-fiſh is furniſhed with two pair of fins longer than the body, and theſe alſo moved by a ſtronger ſet of muſcles than any other. This equality of power ſeems to furniſh one of the moſt entertaining ſpectacles thoſe ſeas can

exhibit. The efforts to ſeize on the one ſide, and the arts of eſcaping on the other, are perfectly amuſing. The dorado is ſeen, upon this occaſion, darting after its prey, which will not leave the water, while it has the advantage of ſwimming, in the beginning of the chace. But, like an hunted hare, being tired at laſt, it then has recourſe to another expedient for ſafety, by flight. The long fins, which began to grow uſeleſs in the water, are now exerted in a different manner and different direction to that in which they were employed in ſwimming: by this means the timid little animal riſes from the water, and flutters over its ſurface, for two or three hundred yards, till the muſcles employed in moving the wings, are enfeebled by that particular manner of exertion. By this time, however, they have acquired a freſh power of renewing their efforts in the water, and the animal is capable of proceeding with ſome velocity by ſwimming: ſtill, however, the active enemy keeps it in view, and drives it again from the deep; till, at length, the poor little creature is ſeen to dart to ſhorter diſtances, to flutter with greater effort, and to drop down at laſt into the mouth of its fierce purſuer. But not the dorado alone, all animated nature ſeems combined againſt this little fiſh, which

ſeems poſſeſſed of double powers, only to be ſubject to greater dangers. For though it ſhould eſcape from its enemies of the deep, yet the tropic bird and the albatroſs are for ever upon the wing to ſeize it. Thus purſued in either element, it ſometimes ſeeks refuge from a new enemy; and it is not unfrequent for whole ſhoals of them to fall on ſhip-board, where they furniſh man with an object of uſeleſs curioſity.

The warfare in freſh-water is not carried on with ſuch deſtructive activity; nor are the inhabitants of that element ſo numerous. It would ſeem that there is ſomething more favourable to the fecundity of fiſhes in the ocean, than in an element leſs impregnated with ſalt. It has been the opinion of ſome philoſophers, that all fiſh are natives of that great reſervoir; and that only colonies have been ſent up rivers, either through accident, or the neceſſity of procuring ſubſiſtence. They have been led to this opinion by the ſuperior fecundity of ſea fiſh, which breed twenty to one; as well as by their ſuperiority in ſtrength and ſize, over thoſe of the ſame kind found in lakes and rivers. This is a matter too remotely ſpeculative to be worth purſuing; but certain it is, that, in freſh water, fiſhes ſeem to abate much of their courage and rapacity; purſue

each other with leſs violence, and ſeem to be leſs powerfully actuated by all their appetites. The greedineſs with which ſea-fiſh devour the bait is prodigious, if compared with the manner they take it in freſh water. The lines of ſuch fiſhermen as go off to ſea, are coarſe, thick and clumſy, compared to what are uſed by thoſe who fiſh at land. Their baits are ſeldom more than a piece of a fiſh, or the fleſh of ſome quadrupede, ſtuck on the hook in a bungling manner; and ſcarce any art is employed to conceal the deception. But it is otherwiſe in freſh water; the lines muſt often be drawn to an hair-like fineneſs; they muſt be tinctured of the peculiar colour of the ſtream; the bait muſt be formed with the niceſt art, and even, if poſſible, to exceed the perfection of nature: yet ſtill the fiſhes approach it with diffidence, and often ſwim round it with diſdain. The cod, on the banks of Newfoundland, the inſtant the hook, which is only baited with the guts of the animal laſt taken, is dropped into the water, darts to it at once, and the fiſhermen have but to pull up as faſt as they throw down. But it is otherwiſe with thoſe who fiſh in freſh waters, they muſt wait whole hours in fruitleſs expectation; and *the patience of a fiſherman* is proverbial among us.

This comparative neglect of food, which is found in all the tribes of freſh water fiſhes, renders them leſs turbulent and leſs deſtructive among each other. Of all theſe the pike is the moſt active and voracious; and our poets, whoſe buſineſs it is to obſerve the ſurface of nature, have called it the tyrant of the watery plain. In fact, in proportion to its ſtrength and celerity, the pike does ſome miſchief; but what are its efforts, compared to thoſe of the cachalot or the ſhark! they reſemble the petty depredations of a robber, put in competition with the ravages of a conqueror! However, the pike will attack every fiſh leſs than itſelf; and it is ſometimes ſeen choaked, by attempting to ſwallow ſuch as are too large a morſel. It is immaterial of what ſpecies the animal it purſues appears to be, whether of another or its own; all are indiſcriminately devoured; ſo that every fiſh owes its ſafety to its minuteneſs, its celerity, or its courage: nor does the pike confine itſelf to feed on fiſh and frogs; it will draw down the water-rat and the young ducks, as they are ſwimming about. Geſner tells us of a mule that ſtooped to drink in the water, when a famiſhed pike, that was near, ſeized it by the noſe, nor was it diſengaged till the beaſt flung it on ſhore. So great is their rapacity, that

they will contend with the otter for his prey, and even endeavour to force it from him. For this reaſon it is dreaded by all other fiſh; and the ſmall ones ſhew the ſame uneaſineſs and deteſtation at the preſence of their tyrant, as the little birds do at the ſight of an hawk or an owl. When the pike lies aſleep near the ſurface, as is frequently the caſe, the leſſer fiſh are often obſerved to ſwim around it in vaſt numbers, with a mixture of caution and terror.

The other tribes of freſh water fiſh are much inferior to this animal in courage and rapacity: they chiefly ſubſiſt upon worms and inſects, purſuing them at the bottom, or jumping after them to the ſurface of the water. In winter alſo, their appetite ſeems entirely to forſake them; at leaſt they continue in ſo torpid a ſtate, that few baits will tempt them to their deſtruction. At that ſeaſon, they forſake the ſhallow waters, and ſeek thoſe deep holes to be found in every river, where they continue for days together, without ever appearing to move. The cold ſeems to affect them; for at that time they lie cloſe to the bottom, where the water is moſt warm, and ſeldom venture out except the day be peculiarly fine, and the ſhallows at the edges of the ſtream become tepified by the powerful rays of the ſun. Indeed, I have been aſſured, that

ſome fiſhes may be rendered ſo torpid by the cold, in the northern rivers, as to be frozen up, in the great maſſes of ice, in which they continue for ſeveral months together, ſeemingly without life or ſenſation, the priſoners of congelation, and waiting the approach of a warmer ſun, to reſtore them at once to life and liberty. Thus that chearful luminary not only diſtributes health and vegetation to the productions of the earth, but is ardently ſought even by the gelid inhabitants of the water.

As fiſh are enemies one to another, ſo each ſpecies is infeſted with worms of different kinds, peculiar to itſelf. The great fiſh abound with them; and the little ones are not entirely free. Theſe troubleſome vermin lodge themſelves either in the jaws, and the inteſtines internally, or near the fins without. When fiſh are healthy and fat, they are not much annoyed by them; but in winter, when they are lean or ſickly, they then ſuffer very much.

Nor does the reputed longevity of this claſs ſecure them from their peculiar diſorders. They are not only affected by too much cold, but there are frequently certain diſpoſitions of the element in which they reſide, unfavourable to their health and propagation. Some ponds they will not breed in, however

artfully diſpoſed for ſupplying them with freſh recruits of water, as well as proviſion. In ſome ſeaſons they are found to feel epidemic diſorders, and are ſeen dead by the water-ſide, without any apparent cauſe: yet ſtill they are animals of all others the moſt vivacious, and they often live and ſubſiſt upon ſuch ſubſtances as are poiſonous to the more perfect claſſes of animated nature.

It is not eaſy to determine whether the poiſonous qualities which many of them are found to poſſeſs, either when they wound our bodies externally with their ſpines, or when they are unwarily eaten at our tables, ariſes from this cauſe. That numbers of fiſhes inflict poiſonous wounds, in the opinion of many, cannot be doubted. The concurrent teſtimony of mankind, they think ſufficient to contradict any reaſonings upon this head, taken from anatomical inſpection. The great pain that is felt from the ſting given by the back fin of the weever, bears no proportion to the ſmallneſs of the inſtrument that inflicts the wound. How the poiſon is preſerved, or how it is conveyed by the animal, it is not in our power to perceive; but its actual exiſtence has been often atteſted by painful experience. In this inſtance we muſt decline conjecture, ſatisfied with hiſtory.

The fact of their being poiſonous when eaten, is equally notorious; and the cauſe equally inſcrutable. My poor worthy friend Dr. Grainger, who reſided for many years at St. Chriſtopher's, aſſured me, that of the fiſh caught, of the ſame kind, at one end of the iſland, ſome were the beſt and moſt wholeſome in the world; while others taken at a different end, were always dangerous, and moſt commonly fatal. We have a paper in the Philoſophical Tranſactions, giving an account of the poiſonous qualities of thoſe found at New Providence, one of the Bahama iſlands. The author there aſſures us, that the greateſt part of the fiſh of that dreary coaſt, are all of a deadly nature: their ſmalleſt effects being to bring on a terrible pain in the joints, which, if terminating favourably, leaves the patient without any appetite for ſeveral days after. It is not thoſe of the moſt deformed figure, or the moſt frightful to look at, that are alone to be dreaded; all kinds, at different times, are alike dangerous; and the ſame ſpecies which has this day ſerved for nouriſhment, is the next, if tried, found to be fatal!

This noxious quality has given riſe to much ſpeculation, and many conjectures. Some have ſuppoſed it to ariſe from the fiſhes on theſe ſhores eating of the machinel apple, a deadly

vegetable poiſon, that ſometimes grows pendent over the ſea: but the quantity of thoſe trees, growing in this manner, bears no proportion to the extenſive infection of the fiſh. Labat has aſcribed it to their eating the gally fiſh, which is itſelf moſt potently poiſonous; but this only removes our wonder a little farther back; for it may be aſked, with as juſt a cauſe for curioſity, how comes the gally fiſh itſelf to procure its noxious qualities? Others have aſcribed the poiſon of theſe fiſhes to their feeding upon coperas beds: but I do not know of any copper mines found in America. In ſhort, as we cannot deſcribe the alembic by which the rattle-ſnake diſtils its malignity, nor the proceſs by which the ſcorpion, that lives among roſes, converts their ſweets to venom, ſo we cannot diſcover the manner by which fiſhes become thus dangerous; and it is well for us of Europe that we can thus wonder in ſecurity. It is certain that, with us, if fiſhes, ſuch as carp or tench, acquire any diſagreeable flavour from the lakes in which they have been bred, this can be removed, by their being kept ſome time in finer and better water: there they ſoon clear away all thoſe diſagreeable qualities their fleſh had contracted, and become as delicate as if they had been always fed in the moſt cleanly

manner. But this expedient is with us rather the precaution of luxury, than the effect of fear; we have nothing to dread from the noxious qualities of our fiſh; for all the animals our waters furniſh are wholeſome.

Happy England! where the ſea furniſhes an abundant and luxurious repaſt, and the freſh waters an innocent and harmleſs paſtime; where the angler, in chearful ſolitude, ſtrolls by the edge of the ſtream, and fears neither the coiled ſnake, nor the lurking crocodile; where he can retire at night, with his few trouts, to borrow the pretty deſcription of old Walton, to ſome friendly cottage, where the landlady is good, and the daughter innocent and beautiful; where the room is cleanly, with lavender in the ſheets, and twenty ballads ſtuck about the wall! There he can enjoy the company of a talkative brother ſportſman, have his trouts dreſſed for ſupper, tell tales, ſing old tunes, or make a catch! There he can talk of the wonders of nature with learned admiration, or find ſome harmleſs ſport to content him, and paſs away a little time, without offence to God, or injury to man!

OF

# Cruſtaceous and Teſtaceous

# *F I S H E S.*

# CHAP. I.

## Of the Diviſion of Shell Fiſh.

IN deſcribing the inhabitants of the water, a claſs of animals occur, that mankind, from the place of their reſidence, have been content to call fiſh; but that naturaliſts, from their formation, have juſtly agreed to be unworthy of the name. Indeed, the affinity many of this kind bear to the inſect tribe, may very well plead for the hiſtorian who ranks them rather as inſects. However, the common language of a country muſt not be ſlightly invaded; the names of things may remain, if the philoſopher be careful to give preciſion to our ideas of them.

There are two claſſes of animals, therefore, inhabiting the water, which commonly receive the name of fiſhes, entirely different from thoſe we have been deſcribing, and alſo very diſtinct from each other. Theſe are divided by naturaliſts into Cruſtaceous and Teſtaceous animals: both, totally unlike fiſhes to appearance, ſeem to invert the order of nature; and as thoſe have their bones on the inſide, and their muſcles hung upon them for the purpoſes of life and motion, theſe, on the contrary, have all their bony parts on

the outſide, and all their muſcles within. Not to talk myſteriouſly—all who have ſeen a lobſter or an oyſter, perceive that the ſhell in theſe bears a ſtrong analogy to the bones of other animals; and that, by theſe ſhells, the animal is ſuſtained and defended.

Cruſtaceous fiſh, ſuch as the crab and the lobſter, have a ſhell not quite of a ſtony hardneſs, but rather reſembling a firm cruſt, and in ſome meaſure capable of yielding. Teſtaceous fiſhes, ſuch as the oyſter or cockle, are furniſhed with a ſhell of a ſtony hardneſs; very brittle, and incapable of yielding. Of the cruſtaceous kinds are the Lobſter, the Crab, and the Tortoiſe: of the teſtaceous, that numerous tribe of Oyſters, Muſcles, Cockles, and Sea Snails, which offer with infinite variety.

The cruſtaceous tribe ſeem to hold the middle rank between fiſhes, properly ſo called, and thoſe ſnail like animals that receive the name of teſtaceous fiſhes. Their muſcles are ſtrong and firm, as in the former; their ſhell is ſelf-produced, as among the latter. They have motion, and hunt for food with great avidity, like the former. They are incapable of ſwimming, but creep along the bottom, like the latter: in ſhort, they form the link that unites theſe two claſſes, that ſeem ſo very oppoſite in their natures.

Of teſtaceous fiſhes we will ſpeak hereafter. As to animals of the cruſtaceous kind, they are very numerous, their figure offers an hundred varieties: but as to their nature, they are obviouſly divided into two very diſtinct kinds, differing in their habits and their conformation. The chief of one kind is the Lobſter; the chief of the other, the Tortoiſe. Under the Lobſter we rank the Prawn, the Cray Fiſh, the Shrimp, the Sea Crab, the Land Crab, and all their varieties. Under the Sea Tortoiſe, the Turtle, the Hawkſbill Turtle, the Land Tortoiſe, and their numerous varieties.

CHAP.

## CHAP. II.

### Cruſtaceous Animals of the Lobſter Kind.

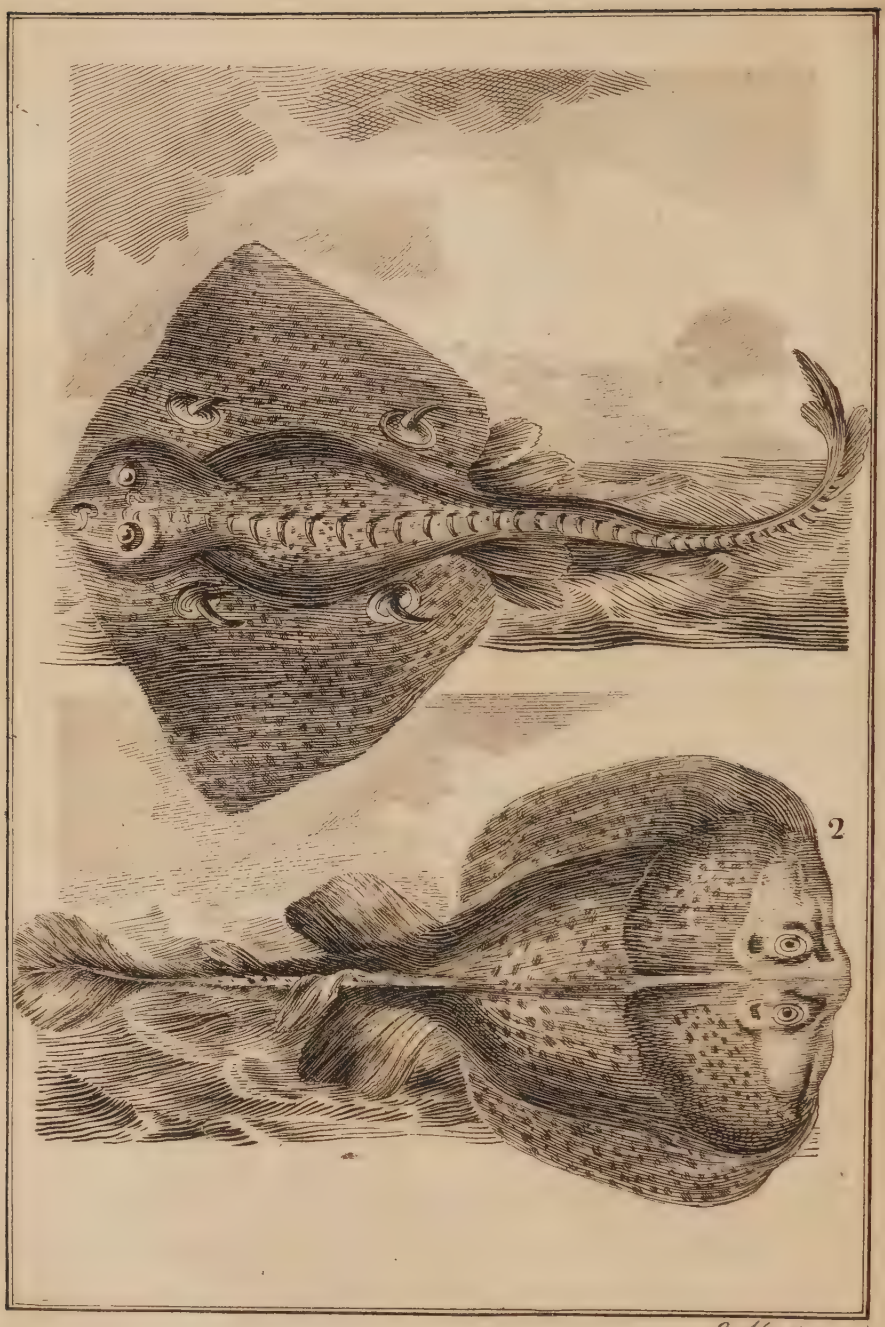
HOWEVER different in figure the lobſter and the crab may ſeem, their manners and conformation are nearly the ſame. With all the voracious appetites of fiſhes, they are condemned to lead an inſect life at the bottom of the water; and though preſſed by continual hunger, they are often obliged to wait till accident brings them their prey. Though without any warmth in their bodies, or even without red blood circulating through their veins, they are animals wonderfully voracious. Whatever they ſeize upon that has life, is ſure to periſh, though never ſo well defended: they even devour each other: and, to encreaſe our ſurprize ſtill more, they may, in ſome meaſure, be ſaid to eat themſelves; as they change their ſhell and their ſtomach every year, and their old ſtomach is generally the firſt morſel that ſerves to glut the new.

The lobſter is an animal of ſo extraordinary a form, that thoſe who firſt ſee it are apt to miſtake the head for the tail; but it is ſoon diſcovered that the animal moves with its claws foremoſt; and that the part which plays

within itſelf by joints, like a coat of armour, is the tail. The two great claws are the lobſter's inſtruments of proviſion and defence; theſe, by opening like a pair of nippers, have great ſtrength, and take a firm hold; they are uſually notched, like a ſaw, which ſtill more encreaſes their tenacity. Beſide theſe powerful inſtruments, which may be conſidered as arms, the lobſter has eight legs, four on each ſide; and theſe, with the tail, ſerve to give the animal its progreſſive and ſideling motion. Between the two claws is the animal's head, very ſmall, and furniſhed with eyes that ſeem like two black horny ſpecks on each ſide; and theſe it has a power of advancing out of the ſocket, and drawing in at pleaſure. The mouth, like that of inſects, opens the long way of the body; not croſſways, as with man, and the higher race of animals. It is furniſhed with two teeth for the comminution of its food; but as theſe are not ſufficient, it has three more in the ſtomach; one on each ſide, and the other below. Between the two teeth there is a fleſhy ſubſtance, in the ſhape of a tongue. The inteſtines conſiſt of one long bowel, which reaches from the mouth to the vent; but what this animal differs in from all others, is, that the ſpinal marrow is in the breaſt-bone. It is furniſhed with two long

feelers or horns, that iſſue on each ſide of the head, that ſeem to correct the dimneſs of its ſight, and apprize the animal of its danger, or of its prey. The tail, or that jointed inſtrument at the other end, is the grand inſtrument of motion; and with this it can raiſe itſelf in the water. Under this we uſually ſee lodged the ſpawn in great abundance; every pea adhering to the next by a very fine filament, which is ſcarcely perceivable. Every lobſter is an hermaphrodite, and is ſuppoſed to be ſelf-impregnated! The ovary, or place where the ſpawn is firſt produced, is backwards, toward the tail, where a red ſubſtance is always found, and which is nothing but a cluſter of peas, that are yet too ſmall for excluſion. From this receptacle there go two canals, that open on each ſide at the jointures of the ſhell, at the belly; and through theſe paſſages the peas deſcend to be excluded, and placed under the tail, where the animal preſerves them from danger for ſome time, until they come to maturity; when, being furniſhed with limbs and motion, they drop off into the water.

When the young lobſters leave the parent, they immediately ſeek for refuge in the ſmalleſt clefts of rocks, and in ſuch like crevices at the bottom of the ſea, where the entrance is but ſmall, and the opening can be eaſily defended.




E. Martin sc.

The Ray *V. 6. p. 248.* 2 The Torpedo. *V. 6. p. 261.*

There, without ſeeming to take any food, they grow larger in a few weeks time, from the mere accidental ſubſtances which the water waſhes to their retreats. By this time alſo they acquire an hard, firm ſhell, which furniſhes them with both offenſive and defenſive armour. They then begin to iſſue from their fortreſſes, and boldly creep along the bottom, in hopes of meeting with more diminutive plunder. The ſpawn of fiſh, the ſmaller animals of their own kind, but chiefly the worms that keep at the bottom of the ſea, ſupply them with plenty. They keep in this manner cloſe among the rocks, buſily employed in ſcratching up the ſand with their claws for worms, or ſurprizing ſuch heedleſs animals as fall within their graſp: thus they have little to apprehend, except from each other; for in them, as among fiſhes, the large are the moſt formidable of all other enemies to the ſmall.

But this life of abundance and ſecurity is ſoon to have a moſt dangerous interruption; for the body of the lobſter ſtill continuing to encreaſe, while its ſhell remains inalterably the ſame, the animal becomes too large for its habitation, and impriſoned within the cruſt that has naturally gathered round it, there comes on a neceſſity of getting free. The young of this

kind, therefore, that grow faſter, as I am aſſured by the fiſhermen, change their ſhell oftener than the old, who come to their full growth, and who remain in the ſame ſhell often for two years together. In general, however, all theſe animals change their ſhell once a year; and this is not only a moſt painful operation, but alſo ſubjects them to every danger. Their molting ſeaſon is generally about the beginning of ſummer; at which time their food is in plenty, and their ſtrength and vigour in the higheſt perfection. But ſoon all their activity ceaſes: they are ſeen forſaking the open parts of the deep, and ſeeking ſome retired ſituation among the rocks, or ſome outlet where they may remain in ſafety from the attacks of their various enemies. For ſome days before their change, the animal diſcontinues its uſual voraciouſneſs; it is no longer ſeen laborioufly harrowing up the ſand at the bottom, or fighting with others of its kind, or hunting its prey; it lies torpid and motionleſs, as if in anxious expectation of the approaching change. Juſt before caſting its ſhell, it throws itſelf upon its back, ſtrikes its claws againſt each other, and every limb ſeems to tremble; its feelers are agitated, and the whole body is in violent motion: it then ſwells itſelf in an unuſual manner,

and at laſt the ſhell is ſeen beginning to divide at its junctures; particularly it opens at the junctures of the belly, where, like a pair of jumps, it was before but ſeemingly united. It alſo ſeems turned inſide out; and its ſtomach comes away with its ſhell. After this, by the ſame operation, it diſengages itſelf of the claws, which burſt at the joints; the animal, with a tremulous motion, caſting them off as a man would kick off a boot that was too big for him.

Thus, in a ſhort time, this wonderful creature finds itſelf at liberty; but in ſo weak and enfeebled a ſtate, that it continues for ſeveral hours motionleſs. Indeed, ſo violent and painful is the operation, that many of them die under it; and thoſe which ſurvive, are in ſuch a weakly ſtate for ſome time, that they neither take food, nor venture from their retreats. Immediately after this change, they have not only the ſoftneſs, but the timidity of a worm. Every animal of the deep is then a powerful enemy, which they can neither eſcape nor oppoſe; and this, in fact, is the time when the dog-fiſh, the cod, and the ray, devour them by hundreds. But this ſtate of defenceleſs imbecillity continues for a very ſhort time: the animal, in leſs than two days, is ſeen to have the ſkin that covered

its body grown almoſt as hard as before; its appetite is ſeen to encreaſe; and, ſtrange to behold! the firſt object that tempts its gluttony, is its own ſtomach, which it ſo lately was diſengaged from. This it devours with great eagerneſs; and ſome time after eats even its former ſhell. In about forty-eight hours, in proportion to the animal's health and ſtrength, the new ſhell is perfectly formed, and as hard as that which was but juſt thrown aſide.

To contribute to the ſpeedy growth of the ſhell, it is ſuppoſed by ſome, that the lobſter is ſupplied with a very extraordinary concretion within its body, that is converted into the ſhelly ſubſtance. It is a chalky ſubſtance, found in the lower part of the ſtomach of all lobſters, improperly called crab's eyes, and ſold under that title in the ſhops. About the time the lobſter quits its ſhell, the teeth in its ſtomach break theſe ſtones to pieces, and the fluids contained therein diſſolve them. This fluid, which ſtill remains in the new ſtomach, is thought to be replete with a petrifying quality, proper for forming a new ſhell: however, the concreting power that firſt formed theſe, ſhews a ſufficient power in the animal to produce alſo the ſhell; and it is going but a ſhort way in the cauſes of things, when we attempt to explain one wonder by another.

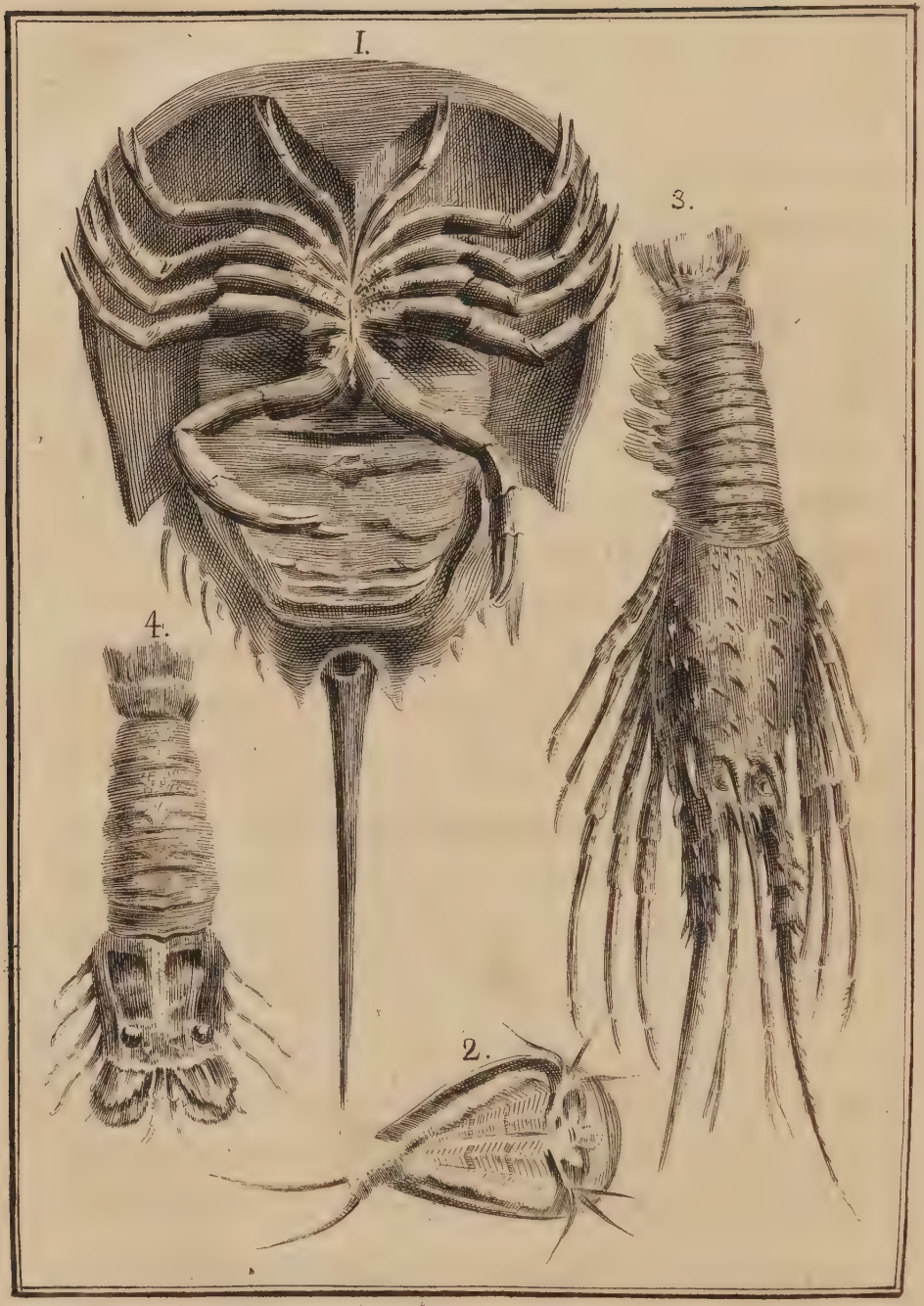
When the lobſter is compleatly equipped in its new ſhell, it then appears how much it has grown in the ſpace of a very few days; the dimenſions of the old ſhell being compared with thoſe of the new, it will be found that the creature is encreaſed above a third in its ſize; and, like a boy that has outgrown his cloaths, it ſeems wonderful how the deſerted ſhell was able to contain ſo great an animal as entirely fills up the new.

The creature thus furniſhed, not only with a complete covering, but alſo a greater ſhare of ſtrength and courage, ventures more boldly among the animals at bottom; and not a week paſſes that in its combats it does not ſuffer ſome mutilation. A joint, or even a whole claw, is ſometimes ſnapped off in theſe encounters. At certain ſeaſons of the year theſe animals never meet each other without an engagement. In theſe, to come off with the loſs of a leg, or even a claw, is conſidered as no great calamity; the victor carries off the ſpoil to feaſt upon at his leiſure, while the other retires from the defeat to wait for a thorough repair. This repair is not long in procuring. From the place where the joint of the claw was cut away, is ſeen in a moſt ſurprizing manner to burgeon out the beginning of a new claw.

This, if obſerved, at firſt, is ſmall and tender, but grows, in the ſpace of three weeks, to be almoſt as large and as powerful as the old one. I ſay almoſt as large, for it never arrives to the full ſize; and this is the reaſon we generally find the claws of the lobſters of unequal magnitude.

After what has been thus deſcribed, let us pauſe a little, to reflect on the wonders this extraordinary creature offers to our imagination! An animal without bones on the inſide, yet furniſhed with a ſtomach capable of digeſting the hardeſt ſubſtances, the ſhells of muſcles, of oyſters, and even its own; an animal gaining a new ſtomach and a new ſhell at ſtated intervals! Furniſhed with the inſtruments of generation double in both ſexes; and yet with an apparent incapacity of uniting! Without red blood circulating through the body, and yet apparently vigorous and active! But moſt ſtrange of all, an animal endowed with a vital principle that furniſhes out ſuch limbs as have been cut away; and keeps continually combating it, though in conſtant repair to renew its engagements!— Theſe are but a ſmall part of the wonders of the deep, where Nature ſports without a ſpectator!

Of this extraordinary yet well known animal there are many varieties, with ſome differences




*E. Martin sculp.*

1. The Violet Crab.
2. The River Crab.
3. The Sea Lobſter.
4. The Lobſter Crab.

In the claws, but little in the habits or conformation. It is found above three feet long; and if we may admit the ſhrimp and the prawn into the claſs, though unfurniſhed with claws, it is ſeen not above an inch. Theſe all live in the water, and can bear its abſence for but a few hours. The ſhell is black when taken out of the water, but turns red by boiling. The moſt common way of taking the lobſter is in a baſket, or pot, as the fiſhermen call it, made of wicker-work, in which they put the bait, and then throw it to the bottom of the ſea, in ſix or ten fathom water. The lobſters creep into this for the ſake of the bait, but are not able to get out again. The river craw-fiſh differs little from the lobſter, but that the one will live only in freſh water, and the other will thrive only in the ſea.

The crab is an animal found equally in freſh and ſalt water; as well upon land as in the ocean. In ſhape it differs very much from the lobſter, but entirely reſembles it in habits and conformation. The tail in this animal is not ſo apparent as in the former, being that broad flap that ſeems to cover a part of the belly, and when lifted diſcovers the peas or ſpawn, ſituated there in great abundance. It reſembles the lobſter in the number of its claws, which are two; and its legs, which are eight,

four on either ſide. Like the lobſter, it is a bold voracious animal; and ſuch an enmity do crabs bear each other, that thoſe who carry them for ſale to market, often tie their claws with ſtrings to prevent their fighting and maiming themſelves by the way. In ſhort, it reſembles the lobſter in every thing but the amazing bulk of its body compared to the ſize of its head, and the length of its inteſtines, which have many convolutions.

As the crab, however, is found upon land as well as in the water, the peculiarity of its ſituation produces a difference in its habitudes, which it is proper to deſcribe. The Land Crab is found in ſome of the warmer regions of Europe, and in great abundance in all the tropical climates in Africa and America. They are of various kinds, and endued with various properties; ſome being healthful, delicious, and nouriſhing food; others, poiſonous or malignant to the laſt degree; ſome are not above half an inch broad, others are found a foot over; ſome are of a dirty brown, and others beautifully mottled. That animal called the Violet Crab of the Caribbee Iſlands, is the moſt noted both for its ſhape, the delicacy of its fleſh, and the ſingularity of its manners.

The violet crab ſomewhat reſembles two hands cut through the middle and joined to-

gether; for each ſide looks like four fingers, and the two nippers or claws reſemble the thumbs. All the reſt of the body is covered with a ſhell as large as a man's hand and bunched in the middle, on the fore-part of which there are two long eyes of the ſize of a grain of barley, as tranſparent as chryſtal and as hard as horn. A little below theſe is the mouth, covered with a ſort of barbs, under which there are two broad ſharp teeth as white as ſnow. They are not placed, as in other animals, croſs-ways, but in the oppoſite direction, not much unlike the blades of a pair of ſciſſars. With theſe teeth they can eaſily cut leaves, fruits, and rotten wood, which is their uſual food. But their principal inſtrument for cutting and ſeizing their food is their nippers, which catch ſuch an hold, that the animal loſes the limb ſooner than its graſp, and is often ſeen ſcampering off, having left its claw ſtill holding faſt upon the enemy. The faithful claw ſeems to perform its duty, and keeps for above a minute faſtened upon the finger while the crab is making off *. In fact it loſes no great matter by leaving a leg or an arm, for they ſoon grow again, and the animal is found as perfect as before.

This, however, is the leaſt ſurprizing part of

* Brown Jamaic. 423.

this creature's hiſtory: and what I am going to relate, were it not as well known and as confidently confirmed as any other circumſtance in natural hiſtory, it might well ſtagger our belief. Theſe animals live not only in a kind of orderly ſociety in their retreats in the mountains, but regularly once a year march down to the ſea-ſide in a body of ſome millions at a time. As they multiply in great numbers, they chuſe the months of April or May to begin their expedition; and then ſally out by thouſands from the ſtumps of hollow trees, from the clefts of rocks, and from the holes which they dig for themſelves under the ſurface of the earth. At that time the whole ground is covered with this band of adventurers; there is no ſetting down one's foot without treading upon them *. The ſea is their place of deſtination, and to that they direct their march with right-lined preciſion. No geometrician could ſend them to their deſtined ſtation by a ſhorter courſe; they neither turn to the right or left, whatever obſtacles intervene; and even if they meet with a houſe, they will attempt to ſcale the walls to keep the unbroken tenor of their way. But though this be the general order of their route, they upon other occaſions are compelled to conform to

* Labat. Voyage aux Iſle Francoiſe, vol. ii. p. 221.

the face of the country; and if it be interſected by rivers, they are then ſeen to wind along the courſe of the ſtream. The proceſſion ſets forward from the mountains with the regularity of an army under the guidance of an experienced commander. They are commonly divided into three battalions; of which, the firſt conſiſts of the ſtrongeſt and boldeſt males, that, like pioneers, march forward to clear the route and face the greateſt dangers. Theſe are often obliged to halt for want of rain, and go into the moſt convenient encampment till the weather changes. The main body of the army is compoſed of females, which never leave the mountains till the rain is ſet in for ſome time, and then deſcend in regular battalia, being formed into columns of fifty paces broad and three miles deep, and ſo cloſe that they almoſt cover the ground. Three or four days after this the rear-guard follows; a ſtraggling undiſciplined tribe, conſiſting of males and females, but neither ſo robuſt nor ſo numerous as the former. The night is their chief time of proceeding; but if it rains by day, they do not fail to profit by the occaſion; and they continue to move forward in their ſlow uniform manner. When the ſun ſhines and is hot upon the ſurface of the ground, they then make an univerſal halt, and

wait till the cool of the evening. When they are terrified, they march back in a confuſed diſorderly manner, holding up their nippers, with which they ſometimes tear off a piece of the ſkin, and then leave the weapon where they inflicted the wound. They even try to intimidate their enemies; for they often clatter their nippers together, as if it were to threaten thoſe that come to diſturb them. But though they thus ſtrive to be formidable to man, they are much more ſo to each other; for they are poſſeſſed of one moſt unſocial property, which is, that if any of them by accident is maimed in ſuch a manner as to be incapable of proceeding, the reſt fall upon and devour it on the ſpot, and then purſue their journey.

When after a fatiguing march and eſcaping a thouſand dangers, for they are ſometimes three months in getting to the ſhore, they have arrived at their deſtined port, they prepare to caſt their ſpawn. The peas are as yet within their bodies, and not excluded, as is uſual in animals of this kind, under the tail; for the creature waits for the benefit of the ſea-water to help the delivery. For this purpoſe, the crab has no ſooner reached the ſhore, than it eagerly goes to the edge of the water, and lets the waves waſh over its body two or three

times. This ſeems only a preparation for bringing their ſpawn to maturity; for without farther delay they withdraw to ſeek a lodging upon land: in the mean time, the ſpawn grows larger, is excluded out of the body, and ſticks to the barbs under the flap, or more properly the tail. This bunch is ſeen as big as an hen's egg, and exactly reſembling the rowes of herrings. In this ſtate of pregnancy, they once more ſeek the ſhore for the laſt time, and ſhaking off their ſpawn into the water, leave accident to bring it to maturity. At this time whole ſhoals of hungry fiſh are at the ſhore in expectation of this annual ſupply; the ſea to a great diſtance ſeems black with them; and about two thirds of the crabs eggs are immediately devoured by theſe rapacious invaders. The eggs that eſcape are hatched under the ſand; and ſoon after millions at a time of theſe little crabs are ſeen quitting the ſhore, and ſlowly travelling up to the mountains.

The old ones, however, are not ſo active to return; they have become ſo feeble and lean, that they can hardly creep along, and the fleſh at that time changes its colour. The moſt of them, therefore, are obliged to continue in the flat parts of the country till they recover, making holes in the earth, which they cover at the

mouth with leaves and dirt ſo that no air may enter. There they throw off their old ſhells, which they leave as it were quite whole, the place where they opened on the belly being unſeen. At that time they are quite naked, and almoſt without motion for ſix days together, when they become ſo fat as to be delicious food. They have then under their ſtomachs four large white ſtones, which gradually decreaſe in proportion as the ſhell hardens, and when they come to perfection are not to be found. It is at that time that the animal is ſeen ſlowly making its way back; and all this is moſt commonly performed in the ſpace of ſix weeks.

This animal when poſſeſſed of its retreats in the mountains is impregnable; for only ſubſiſting upon vegetables, it ſeldom ventures out; and its habitation being in the moſt inacceſſible places, it remains for a great part of the ſeaſon in perfect ſecurity. It is only when impelled by the deſire of bringing forth its young, and when compelled to deſcend into the flat country, that it is taken. At that time the natives wait for its deſcent in eager expectation, and deſtroy thouſands; but diſregarding the bodies, they only ſeek for that ſmall ſpawn which lies on each ſide of the ſtomach within the ſhell, of about

the thickneſs of a man's thumb. They are much more valuable upon their return after they have caſt their ſhell; for being covered with a ſkin reſembling ſoft parchment, almoſt every part except the ſtomach may be eaten. They are taken in their holes by feeling for them in the ground with an inſtrument: they are ſought after by night, when on their journey, with flambeaux. The inſtant the animal perceives itſelf attacked, it throws itſelf on its back, and with its claws pinches moſt terribly whatever it happens to faſten on. But the dextrous crab-catcher takes them by the hinder legs in ſuch a manner, that its nippers cannot touch him, and thus he throws it into his bag Sometimes alſo they are caught when they take refuge at the bottom of holes, in rocks by the ſea-ſide, by clapping a ſtick at the mouth of the hole, which prevents their getting out; and then ſoon after the tide coming, enters the hole, and the animal is found upon its retiring drowned in its retreat.

Theſe crabs are of conſiderable advantage to the natives; and the ſlaves very often feed entirely upon them. In Jamaica, where they are found in great plenty, they are conſidered as one of the greateſt delicacies of the place. Yet ſtill, the eating of them is attended with

ſome danger; for even of this kind many are found poiſonous, being fed, as it is thought, upon the makinel apple; and whenever they are found under that noxious plant, they are always rejected with caution. It is thus with almoſt all the productions of thoſe luxurious climates; however tempting they may be to the appetite, they but too often are found deſtructive; and ſcarce a delicacy among them that does not carry its own alloy.

The deſcent of theſe creatures for ſuch important purpoſes deſerves our admiration; but there is an animal of the lobſter kind that annually deſcends from its mountains in like manner, and for purpoſes ſtill more important and various. Its deſcent is not only to produce an offspring, but to provide itſelf a covering; not only to ſecure a family, but to furniſh an houſe. The animal I mean is the ſoldier-crab, which has ſome ſimilitude to the lobſter, if diveſted of its ſhell. It is uſually about four inches long, has no ſhell behind, but is covered down to the tail with a rough ſkin, terminating in a point. It is however armed with ſtrong hard nippers before, like the lobſter; and one of them is as thick as a man's thumb, and pinches moſt powerfully. It is, as I ſaid, without a ſhell to any part except its nippers; but what

Nature has denied this animal it takes care to ſupply by art; and taking poſſeſſion of the deſerted ſhell of ſome other animal, it reſides in it, till, by growing too large for its habitation, it is under a neceſſity of change. It is a native of the Weſt-India Iſlands; and, like the former, it is ſeen every year deſcending from the mountains to the ſea-ſhore, to depoſit its ſpawn, and to provide itſelf with a new ſhell. This is a moſt buſtling time with it, having ſo many things to do; and, in fact, very buſy it appears. It is very probable that its firſt care is to provide for its offspring before it attends to its own wants; and it is thought, from the number of little ſhells which it is ſeen examining, that it depoſits its ſpawn in them, which thus is placed in perfect ſecurity till the time of excluſion.

However this be, the ſoldier is in the end by no means unmindful of itſelf. It is ſtill ſeen in its old ſhell, which it appears to have conſiderably outgrown; for a part of the naked body is ſeen at the mouth of it, which the habitation is too ſmall to hide. A ſhell, therefore, is to be found large enough to cover the whole body; and yet not ſo large as to be unmanageable and unwieldy. To anſwer both theſe ends is no eaſy matter, nor the attainment of a ſlight

enquiry. The little ſoldier is ſeen buſily parading the ſhore along that line of pebbles and ſhells that is formed by the extremeſt wave; ſtill, however, dragging its old incommodious habitation at its tail, unwilling to part with one ſhell, even though a troubleſome appendage, till it can find another more convenient. It is ſeen ſtopping at one ſhell, turning it and paſſing it by, going on to another, contemplating that for a while, and then ſlipping its tail from its old habitation, to try on the new. This alſo is found to be inconvenient; and it quickly returns to its old ſhell again. In this manner it frequently changes, till at laſt it finds one light, roomy and commodious; to this it adheres, though the ſhell be ſometimes ſo large as to hide the body of the animal, claws and all *.

Yet it is not till after many trials, but many combats alſo, that the ſoldier is thus completely equipped; for there is often a conteſt between two of them for ſome well looking favourite ſhell for which they are rivals. They both endeavour to take poſſeſſion; they ſtrike with their claws; they bite each other, till the weakeſt is obliged to yield, by giving up the object of diſpute. It is then that the victor immediately takes

* Pere du Teſtre.

poſſeſſion, and parades it in his new conqueſt three or four times back and forward upon the ſtrand before his envious antagoniſt.

When this animal is taken, it ſends forth a feeble cry, endeavouring to ſeize the enemy with its nippers; which if it faſtens upon it will ſooner die than quit the graſp. The wound is very painful, and not eaſily cured. For this reaſon, and as it is not much eſteemed for its fleſh, it is generally permitted to return to its old retreat to the mountains in ſafety. There it continues till the neceſſity of changing once more, and the deſire of producing an offspring, expoſe it to freſh dangers the year enſuing.

CHAP.

## CHAP. III.

### Of the Tortoiſe and its Kinds.

HAVING deſcribed the lobſter and the crab as animals in ſome meaſure approaching to the inſect tribes, it will appear like injuſtice to place the Tortoiſe among the number, that, from its ſtrength, its docility, the warm red blood that is circulating in its veins, deſerves to be ranked even above the fiſhes. But as this animal is covered, like the lobſter, with a ſhell, as it is of an amphibious nature, and brings forth its young from the egg without hatching, we muſt be content to degrade it among animals that in every reſpect it infinitely ſurpaſſes.

Tortoiſes are uſually divided into thoſe that live upon land, and thoſe that ſubſiſt in the water; and uſe has made a diſtinction even in the name; the one being called Tortoiſes, the other Turtles. However, Seba has proved that all tortoiſes are amphibious; that the land tortoiſe will live in the water; and that the ſea turtle can be fed upon land. A land tortoiſe was brought to him that was caught in one of the canals of Amſterdam, which he kept for half a year in his houſe, where it lived very well

contented in both elements. When in the water it remained with its head above the ſurface; when placed in the ſun, it ſeemed delighted with its beams, and continued immovable while it felt their warmth. The difference, therefore, in theſe animals, ariſes rather from their habits than their conformation; and, upon examination, there will be leſs variety found between them than between birds that live upon land, and thoſe that ſwim upon the water.

Yet, though Nature ſeems to have made but few diſtinctions among theſe animals, as to their conformation, yet, in their habits, they are very diſſimilar; as theſe reſult from the different qualities of their food, and the different ſorts of enemies they have to avoid or encounter. I will therefore exhibit their figure and conformation under one common deſcription, by which their ſlight differences will be more obvious; and then I will give a ſeparate hiſtory of the manners of each, as naturaliſts and travellers have taught us.

All tortoiſes, in their external form, pretty much reſemble each other; their outward covering being compoſed of two great ſhells, the one laid upon the other, and only touching at the edges: however, when we come to look cloſer, we ſhall find that the upper ſhell is com-

poſed of no leſs than thirteen pieces, which are laid flat upon the ribs, like the tiles of an houſe, by which the ſhell is kept arched and ſupported. The ſhells both above and below that, which ſeem, to an inattentive obſerver, to make each but one piece, are bound together at the edges by very ſtrong and hard ligaments, yet with ſome ſmall ſhare of motion. There are two holes at either edge of this vaulted body; one for a very ſmall head, ſhoulders and arms, to peep through; the other at the oppoſite edge, for the feet and the tail. Theſe ſhells the animal is never diſengaged from; and they ſerve for its defence againſt every creature but man.

The tortoiſe has but a ſmall head, with no teeth; having only two bony ridges in the place, ſerrated and hard. Theſe ſerve to gather and grind its food; and ſuch is the amazing ſtrength of the jaws, that it is impoſſible to open them where they once have faſtened. Even when the head is cut off, the jaws ſtill keep their hold; and the muſcles, in death, preſerve a tenacious rigidity. Indeed, the animal is poſſeſſed of equal ſtrength in all other parts of its body: the legs, though ſhort, are inconceivably ſtrong; and torpid as the tortoiſe may appear, it has been known to carry five men ſtanding

upon its back, with apparent eaſe and unconcern. Its manner of going forward is by moving its legs one after the other; and the claws with which the toes are furniſhed, ſink into the ground like the nails of an iron ſhod wheel, and thus aſſiſt its progreſſion.

With reſpect to its internal parts, not to enter into minute anatomical diſquiſitions, it may not be improper to obſerve, that the blood circulates in this animal as in ſome cartilaginous fiſhes, and ſomething in the manner of a child in the womb. The greateſt quantity of the blood paſſes directly from the vena cava into the left ventricle of the heart, which communicates with the right ventricle by an opening; while the auricles only receive what the ventricles ſeem incapable of admitting. Thus the blood is driven by a very ſhort paſſage through the circulation; and the lungs ſeem to lend only occaſional aſſiſtance. From this conformation the animal can ſubſiſt for ſome time, without uſing the lungs or breathing; at leaſt, the lungs are not ſo neceſſary an inſtrument for driving on the circulation as with us.

Such is the general ſtructure of this animal, whether found to live by land or water. With regard to the differences of theſe animals, the

land tortoiſe, from its habits of making uſe of its feet in walking, is much more nimble upon land than the ſea turtle: the land tortoiſe, if thrown upon its back, by rocking and balancing its body, like a child rocking in a cradle, at laſt turns itſelf upon its face again; but the turtle, when once turned, continues without being able to move from the ſpot. In comparing the feet alſo of theſe animals, the nails upon the toes of one that has been long uſed to ſcratch for ſubſiſtence upon land, are blunt and worn; while thoſe that have only been employed in ſwimming, are ſharp and long, and have more the ſimilitude of fins. The brain of the land tortoiſe is but ſmall; and yet it is three times as large as that of the turtle. There is a difference alſo in the ſhape of their eggs, and in the paſſage by which they are excluded; for, in the land tortoiſe, the paſſage is ſo narrow, that the egg conforms to the ſhape of the aperture, and though round when in the body, yet becomes much more oblong than thoſe of fowls, upon being excluded; otherwiſe they would never be able to paſs through the bony canal by which they are protruded: on the contrary, the paſſage is wider in the turtle, and therefore its eggs are round. Theſe are the moſt ſtriking diſtinctions; but that which is

moſt known is their ſize; the land tortoiſe often not exceeding three feet long, by two feet broad; the ſea turtle being ſometimes from five to ſeven feet long. The ſize, however, is but a fallacious diſtinction; ſince land tortoiſes, in ſome parts of India, grow to a very great magnitude; though probably not, as the ancients affirm, big enough for a ſingle ſhell to ſerve for the covering of an houſe.

But if the different kinds of tortoiſes are not ſufficiently diſtinguiſhed by their figure, they are very obviouſly diſtinguiſhable by their methods of living. The land tortoiſe lives in holes dug in the mountains, or near marſhy lakes; the ſea turtle in cavities of rocks, and extenſive paſtures at the bottom of the ſea. The tortoiſe makes uſe of its feet to walk with, and burrow in the ground; the turtle chiefly uſes its feet in ſwimming, or creeping at bottom.

The land tortoiſe is generally found, as was obſerved above, from one foot to five feet long, from the end of the ſnout to the end of the tail; and from five inches to a foot and an half acroſs the back. It has a ſmall head, ſomewhat reſembling that of a ſerpent; an eye without the upper lid; the under eye-lid ſerving to cover and keep that organ in ſafety. It has a ſtrong, ſcaly tail, like the lizard. Its head the animal

can put out and hide at pleaſure, under the great penthouſe of its ſhell: there it can remain ſecure from all attacks; there, defended on every ſide, it can fatigue the patience of the moſt formidable animal of the foreſt, that makes uſe only of natural ſtrength to deſtroy it. As the tortoiſe lives wholly upon vegetable food, it never ſeeks the encounter; yet, if any of the ſmaller animals attempt to invade its repoſe, they are ſure to ſuffer. The tortoiſe, impregnably defended, is furniſhed with ſuch a ſtrength of jaw, that, though armed only with bony plates inſtead of teeth, wherever it faſtens, it infallibly keeps its hold, until it has taken out the piece.

Though peaceable in itſelf, it is formed for war in another reſpect, for it ſeems almoſt endued with immortality. Nothing can kill it; the depriving it of one of its members, is but a ſlight injury; it will live, though deprived of the brain; it will live, though deprived of its head. Redi informs us that, in making ſome experiments upon vital motion, he, in the beginning of the month of November, took a land tortoiſe, made a large opening in its ſkull, and drew out all the brain, waſhed the cavity, ſo as not to leave the ſmalleſt part remaining, and then, leaving the hole open, ſet

the animal at liberty. Notwithſtanding this the tortoiſe marched away without ſeeming to have received the ſmalleſt injury; only it ſhut the eyes, and never opened them afterwards. Soon after the hole in the ſkull was ſeen to cloſe; and, in three days, there was a complete ſkin covering the wound. In this manner the animal lived, without a brain, for ſix months; walking about unconcernedly, and moving its limbs as before. But the Italian philoſopher, not ſatisfied with this experiment, carried it ſtill farther; for he cut off the head, and the animal lived twenty-three days after its ſeparation from the body. The head alſo continued to rattle the jaws, like a pair of caſtanets, for above a quarter of an hour.

Nor are theſe animals leſs long lived than difficult in deſtroying. Tortoiſes are commonly known to exceed eighty years old; and there was one kept in the Archbiſhop of Canterbury's garden, at Lambeth, that was remembered above an hundred and twenty. It was at laſt killed by the ſeverity of a froſt, from which it had not ſufficiently defended itſelf in its winter retreat, which was a heap of ſand, at the bottom of the garden.

The uſual food of the land tortoiſe ſeems not ſo nouriſhing as to ſupply this extraordinary prin-

ciple of vitality. It lives upon vegetables in its retreats in the mountains or the plain; and ſeldom makes its prey of ſnails or worms, but when other food is not found in grateful plenty. It is fond alſo of fruits; and when the foreſt affords them, is generally found not far from where they grow. As it can move but ſlowly, it is not very delicate in the choice of its food; ſo that it uſually fills itſelf with whatever offers. Thoſe that are kept in a domeſtic ſtate, will eat any thing; leaves, fruits, corn bran, or graſs.

From the ſmallneſs of its brain, and the ſlowneſs of its motion, it obviouſly appears to be a torpid, heavy animal, requiring reſt and ſleep; and, in fact, it retires to ſome cavern to ſleep for the winter. I already obſerved that its blood circulated through the heart by a ſhort paſſage; and that it did not, as anatomiſts expreſs it, go through the great circulation. With us and quadrupes the blood goes from the veins to the heart; from the heart it is ſent to be ſpread over the lungs; from the lungs it returns to the heart again; and from thence it goes to the arteries, to be diſtributed through the whole body. But its paſſage in the tortoiſe is much ſhorter; for, from the veins it goes to the heart; then leaving the lungs entirely out of its courſe, it takes a ſhort cut, if I may ſo

ſay, into the beginning of the arteries, which ſend it round the animal frame. From hence we ſee the lungs are left out of the circulation; and conſequently, the animal is capable of continuing to live without continuing to breathe. In this it reſembles the bat, the ſerpent, the mole, and the lizard; like them it takes up its dark reſidence for the winter; and, at that time, when its food is no longer in plenty, it happily becomes inſenſible to the want. Nor is it unmindful to prepare its retreat, and make it as convenient as poſſible; it is ſometimes buried two or three feet in the ground, with its hole furniſhed with moſs, graſs, and other ſubſtances, as well to keep the retreat warm, as to ſerve for food, in caſe it ſhould prematurely wake from its ſtate of ſtupefaction. But it muſt not be ſuppoſed that, while it is thus at reſt, it totally diſcontinues to breathe; on the contrary, an animal of this kind, if put into a cloſe veſſel, without air, will ſoon be ſtifled; though not ſo readily as in a ſtate of vigour and activity.

From this dormant ſtate the tortoiſe is awakened by the genial return of ſpring; and is thought not to be much waſted by its long confinement. To animals that live an hundred and fifty years, a ſleep of ſix months is but as

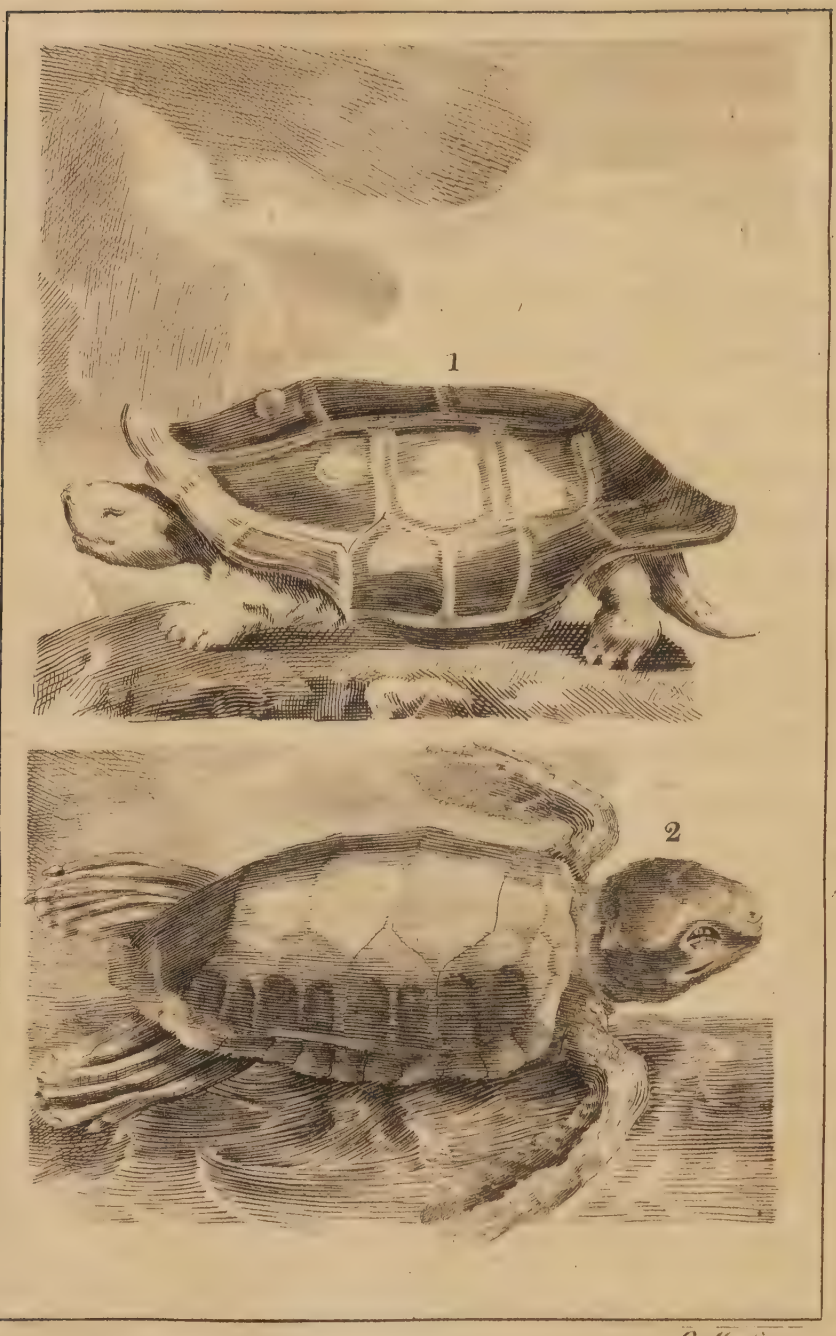
the nap of a night. All the actions of theſe long lived creatures ſeem formed upon a ſcale anſwering the length of their exiſtence: their ſlumbers are for a ſeaſon; their motions are ſlow, and require time in every action: even the act of procreation, which among other animals is performed in a very few minutes, is with them the buſineſs of days. About a month after their enlargement from a torpid ſtate, they prepare to tranſmit their poſterity; and both continue joined, for near a month, together. The eggs of the female are contained in the ovary, above the bladder, which, is extremely large; and theſe are, before their excluſion, round and naked, with ſpots of red: after they are laid, however, they aſſume another form, being ſmaller and longer than thoſe of a hen. This alteration in the figure of the eggs moſt probably proceeds from the narrowneſs of the bony paſſage through which they are excluded. Swammerdam, who compared the ſize of the eggs taken out of this animal's body with the diameter of the paſſage through which they were excluded, was of opinion that the bones themſelves ſeparated from each other, and cloſed again; but, in my opinion, it is more probable to ſuppoſe, that the eggs, and not the bones, alter their form. Certain it is, that they are round in the body, and that they are oval upon being protruded.

The eggs of all the tortoiſe kind, like thoſe of birds, are furniſhed with a yolk and a white; but the ſhell is different, being ſomewhat like thoſe ſoft eggs that hens exclude before their time: however, this ſhell is much thicker and ſtronger, and is a longer time in coming to maturity in the womb. The land tortoiſe lays but a few in number, if compared to the ſea turtle, who depoſits from an hundred and fifty to two hundred in a ſeaſon.

The amount of the land tortoiſe's eggs, I have not been able to learn; but, from the ſcarceneſs of the animal, I am apt to think they cannot be very numerous. When it prepares to lay, the female ſcratches a ſlight depreſſion in the earth, generally in a warm ſituation, where the beams of the ſun have their full effect: there depoſiting her eggs, and covering them with graſs and leaves, ſhe forſakes them, to be hatched by the heat of the ſeaſon. The young tortoiſes are generally excluded in about twenty-ſix days; but, as the heat of the weather aſſiſts, or its coldneſs retards incubation, ſometimes it happens that there is a difference of two or three days. The little animals no ſooner leave the egg than they ſeek for their proviſion, entirely ſelf-taught; and their ſhell, with which they are covered from the be-

ginning, expands and grows larger with age; As it is compoſed of a variety of pieces, they are all capable of extenſion at their ſutures, and the ſhell admits of encreaſe in every direction. It is otherwiſe with thoſe animals, like the lobſter, whoſe ſhell is compoſed all of one piece, that admits of no encreaſe; which, when the tenant is too big for the habitation, muſt burſt the ſhell, and get another. But the covering of the tortoiſe grows larger in proportion as the internal parts expand; in ſome meaſure reſembling the growth of the human ſkull, which is compoſed of a number of bones, encreaſing in ſize in proportion to the quantity of the brain. All tortoiſes, therefore, as they never change their ſhell, muſt have it formed in pieces; and though, in ſome that have been deſcribed by painters or hiſtorians, theſe marks have not been attended to, yet we can have no doubt that they are general to the whole tribe.

It is common enough to take theſe animals into gardens, as they are thought to deſtroy inſects and ſnails in great abundance. We are even told that, in hot countries, they are admitted into a domeſtic ſtate, as they are great deſtroyers of bugs. How ſo large and heavy an animal is capable of being expert at ſuch petty prey, is not eaſy to conceive; but I have




E. Martin sc.

2. The Sea Tortoise or Turtle. *V. 6. p. 393.*

1. The Land Tortoise. *V. 6. p. 380.*

ſeen ſeveral of them about gentlemen's houſes, that, in general, appear torpid, harmleſs and even fond of employment. Children have ſometimes got upon the back of a tortoiſe; and ſuch was the creature's ſtrength, that it never ſeemed overloaded, but moved off with its burthen to where it expected to be fed, but would carry them no further. In winter they regularly find out a place to ſleep in; but in thoſe warm countries in which the tortoiſe is found larger, and in greater plenty than in Europe, they live without retiring the whole year round.

The Sea Tortoiſe, or Turtle as it is now called, is generally found larger than the former. This element is poſſeſſed with the property of encreaſing the magnitude of thoſe animals, which are common to the land and the ocean. The ſea pike is larger than that of freſh-water; the ſea bear is larger than that of the mountains; and the ſea turtle exceeds the land tortoiſe in the ſame proportion. It is of different magnitudes, according to its different kinds; ſome turtles being not above fifty pound weight, and ſome above eight hundred.

The Great Mediterranean Turtle is the largeſt of the turtle kind with which we are acquainted. It is found from five to eight feet long, and from ſix to nine hundred pounds

weight. But, unluckily, its utility bears no proportion to its ſize; as it is unfit for food, and ſometimes poiſon thoſe who eat it. The ſhell alſo, which is a tough ſtrong integument, reſembling an hide, is unfit for all ſerviceable purpoſes. One of theſe animals was taken in the year 1729, at the mouth of the Loire, in nets that were not deſigned for ſo large a capture. This turtle, which was of enormous ſtrength, by its own ſtruggles involved itſelf in the nets in ſuch a manner as to be incapable of doing miſchief: yet, even thus ſhackled, it appeared terrible to the fiſhermen, who were at firſt for flying; but finding it impotent, they gathered courage to drag it on ſhore, where it made a moſt horrible bellowing; and when they began to knock it on the head with their gaffs, it was to be heard at half a mile's diſtance. They were ſtill further intimidated by its nauſeous and peſtilential breath, which ſo powerfully affected them, that they were near fainting. This animal wanted but four inches of being eight feet long, and was above two feet over: its ſhell more reſembled leather than the ſhell of a tortoiſe; and, unlike all other animals of this kind, it was furniſhed with teeth in each jaw, one rank behind another, like thoſe of a ſhark: its feet alſo, different from the reſt of this kind, wanted claws;

and the tail was quite diſengaged from the ſhell, and fifteen inches long, more reſembling that of a quadrupede than a tortoiſe. This animal was then unknown upon the coaſts of France; and was ſuppoſed to have been brought into the European ſeas, in ſome India ſhip that might be wrecked upon her return. Since that, however, two or three of theſe animals have been taken upon the coaſts; two in particular upon thoſe of Cornwall, in the year 1756, the largeſt of which weighed eight hundred pounds; and one upon the Iſle of Rhea, but two years before that, weighed between ſeven and eight hundred. One, moſt probably of this kind alſo, was caught about thirty years ago near Scarborough, and a good deal of company was invited to feaſt upon it: a gentleman, who was one of the gueſts, told the company that it was a Mediterranean turtle, and not wholeſome; but a perſon who was willing to ſatisfy his appetite at the riſque of his life, eat of it: he was ſeized with a violent vomiting and purging; but his conſtitution overpowered the malignity of the poiſon.

Theſe are a formidable and uſeleſs kind, if compared to the turtle caught in the South Seas and the Indian Ocean. Theſe are of different kinds; not only unlike each other

in form, but furniſhing man with very different advantages. They are uſually diſtinguiſhed by ſailors into four kinds; the Trunk Turtle, the Loggerhead, the Hawkſbill, and the Green Turtle.

The Trunk Turtle is commonly larger than the reſt, and its back higher and rounder. The fleſh of this is rank, and not very wholeſome.

The Loggerhead is ſo called from the largeneſs of its head, which is much bigger in proportion than that of the other kinds. The fleſh of this alſo is very rank, and not eaten but in caſe of neceſſity.

The Hawkſbill Turtle is the leaſt of the four, and has a long and ſmall mouth, ſomewhat reſembling the bill of an hawk. The fleſh of this alſo is very indifferent eating; but the ſhell ſerves for the moſt valuable purpoſes. This is the animal that ſupplies the tortoiſe-ſhell of which ſuch a variety of beautiful trinkets are made. The ſubſtance of which the ſhells of other turtles are compoſed, is thin and porous; but that of the hawkſbill is firm, and, when poliſhed, is beautifully marbled. They generally carry about three pounds; but the largeſt of all ſix pounds. The ſhell conſiſts, as in all the kind, of thirteen leaves or plates, of which eight are flat, and five hollow. They are raiſed and

taken off by means of fire, which is made under under the ſhell after the fleſh is taken out. As ſoon as the heat affects the leaves, they ſtart from the ribs, and are eaſily raiſed with the point of a knife. By being ſcraped and poliſhed on both ſides, they become beautifully tranſparent; or are eaſily caſt into what form the workman thinks proper, by making them ſoft and pliant in warm water, and then ſcrewing them in a mold, like a medal: however, the ſhell is moſt beautiful before it undergoes this laſt operation.

But of all animals of the tortoiſe kind, the green turtle is the moſt noted, and the moſt valuable. The delicacy of its fleſh, and its nutritive qualities, together with the property of being eaſily digeſted, were, for above a century, known only to our ſea-men and the inhabitants of the coaſts where they were taken. It was not till by ſlow degrees the diſtinction came to be made between ſuch as were malignant and ſuch as were wholeſome. The controverſies and contradictions of our old travellers were numerous upon this head; ſome aſſerting, that the turtle was delicious food; and others, that it was actual poiſon. Dampier, that rough ſea-man, who has added more to natural hiſtory than half of the philoſophers that went before him, appears to be the firſt who informed us

of their diſtinctions; and that, while the reſt might be valuable for other purpoſes, the green turtle alone was chiefly prized for the delicacy of its fleſh. He never imagined, however, that this animal would make its way to the luxurious tables of Europe; for he ſeems chiefly to recommend it as ſalted up for ſhip's proviſion, in caſe of neceſſity.

At preſent the turtle is very well known among us; and is become the favourite food of thoſe that are deſirous of eating a great deal without the danger of ſurfeiting. This is a property the fleſh of the turtle ſeems peculiarly poſſeſſed of; and by the importation of it alive among us, gluttony is freed from one of its greateſt reſtraints. The fleſh of turtle is become a branch of commerce; and therefore ſhips are provided with conveniences for ſupplying them with water and proviſion, to bring them over in health from Jamaica and other Weſt India iſlands. This, however, is not always effected; for though they are very vivacious, and ſcarce require any proviſion upon the voyage, yet, by the working of the ſhip and their beating againſt the ſides of the boat that contains them, they become battered and lean; ſo that to eat this animal in the higheſt perfection, inſtead of bringing the turtle to

the epicure, he ought to be tranſported to the turtle.

This animal is called the green turtle, from the colour of its ſhell, which is rather greener than that of others of this kind. It is generally found about two hundred weight; though ſome are five hundred, and others not above fifty. Dampier tells us of one that was ſeen at Port Royal in Jamaica, that was ſix feet broad acroſs the back: he does not tell us its other dimenſions; but ſays, that the ſon of Captain Roach, a boy about ten years old, ſailed in the ſhell, as in a boat, from the ſhore to his father's ſhip, which was above a quarter of a mile from land. But this is nothing to the ſize of ſome turtles the ancients ſpeak of. Ælian aſſures us, that the houſes in the Iſland of Taprobane are uſually covered with a ſingle ſhell. Diodorus Siculus tells us, that a people neighbouring on Ethiopia, called the Turtle-eaters, coaſted along the ſhore in boats made of the upper ſhell of this animal; and that in war, when they had eaten the fleſh, the covering ſerved them as a tent. In this account, Pliny, and all the reſt of the ancients agree; and as they had frequent opportunities of knowing the truth, we are not lightly to contradict their teſtimony.

At preſent, however, they are not ſeen of

ſuch amazing dimenſions. We are told, by Laet, that on the Iſle of Cuba they grow to ſuch a ſize, as that five men can ſtand on the back of one of them together; and what is more ſurprizing ſtill, that the animal does not ſeem overloaded, but will go off with them upon its back, with a ſlow ſteady motion, towards the ſea.

They are found in the greateſt numbers on the Iſland of Aſcenſion; where, for ſeveral years, they were taken to be ſalted to feed the ſlaves, or for a ſupply of ſhip's proviſion. Their value at preſent ſeems to be better known.

This animal ſeldom comes from the ſea but to depoſit its eggs, and now and then to ſport in freſh-water. Its chief food is a ſubmarine plant, that covers the bottom of ſeveral parts of the ſea not far from the ſhore. There the turtles are ſeen, when the weather is fair, feeding in great numbers, like flocks of ſheep, ſeveral fathoms deep upon the verdant carpet below. At other times they go to the mouths of rivers, as they ſeem to find gratification in freſh-water. After ſome time thus employed, they ſeek their former ſtations; and when done feeding, they generally float with their heads above water, unleſs they are alarmed by the approach of hunters or birds of prey, in which

caſe they ſuddenly plunge to the bottom. They often ſeek their proviſion among the rocks, feeding upon moſs and ſea-weed; and it is probable will not diſdain to prey upon inſects and other ſmall animals, as they are very fond of fleſh when taken and fed for the table.

At the time of breeding, they are ſeen to forſake their former haunts and their food, and to take ſometimes a voyage of nine hundred miles to depoſite their eggs on ſome favourite ſhore. The coaſts they always reſort to upon theſe occaſions are thoſe that are low, flat, and ſandy; for being heavy animals, they cannot climb a bold ſhore; nor is any bed ſo proper as ſand to lay their eggs on. They couple in March, and continue united till May; during a great part of which time they are ſeen locked together, and almoſt incapable of ſeparation. The female ſeems paſſive and reluctant; but the male graſps her with his claws in ſuch a manner, that nothing can induce him to quit his hold. It would ſeem that the graſp, as in frogs, is in ſome meaſure convulſive, and that the animal is unable to relax its efforts.

When the time for laying approaches, the female is ſeen towards the ſetting of the ſun drawing near the ſhore, and looking earneſtly about her, as if afraid of being diſcovered.

When ſhe perceives any perſon on ſhore, ſhe ſeeks for another place; but if otherwiſe, ſhe lands when it is dark, and goes to take a ſurvey of the ſand where ſhe deſigns to lay. Having marked the ſpot, ſhe goes back without laying for that night, to the ocean again; but the next night returns to depoſite a part of her burthen. She begins by woking and digging in the ſand with her fore-feet till ſhe has made a round hole, a foot broad and a foot and an half deep, juſt at the place a little above where the water reaches higheſt. This done, ſhe lays eighty or ninety eggs at a time, each as big as a hen's egg, and as round as a ball. She continues laying about the ſpace of an hour; during which time, if a cart were driven over her, ſhe would not be induced to ſtir. The eggs are covered with a tough white ſkin, like wetted parchment. When ſhe has done laying, ſhe covers the hole ſo dexterouſly, that it is no eaſy matter to find the place; and theſe muſt be accuſtomed to the ſearch to make the diſcovery. When the turtle has done laying ſhe returns to the ſea, and leaves her eggs to be hatched by the heat of the ſun. At the end of fifteen days ſhe lays about the ſame number of eggs again; and at the end of another fifteen days ſhe repeats the ſame; three

times in all, uſing the ſame precautions every time for their ſafety..

In about twenty-four or twenty-five days after laying, the eggs are hatched by the heat of the ſun; and the young turtles, being about as big as quails, are ſeen burſting from the ſand, as if earth-born, and running directly to the ſea, with inſtinct only for their guide: but, to their great misfortune, it often happens that, their ſtrength being ſmall, the ſurges of the ſea, for ſome few days, beat them back upon the ſhore. Thus expoſed, they remain a prey to thouſands of birds that then haunt the coaſts; and theſe ſtooping down upon them carry off the greateſt part, and ſometimes the whole brood, before they have ſtrength ſufficient to withſtand the waves, or dive to the bottom. Helbigius informs us, that they have ſtill another enemy to fear, which is no other than the parent that produced them, that waits for their arrival at the edge of the deep, and devours as many as ſhe can. This circumſtance however demands further confirmation; though nothing is more certain than that the crocodile acts in the ſame unnatural manner.

When the turtles have done laying they then return to their accuſtomed places of feeding.

Upon their out-ſet to the ſhore, where they breed, they are always found fat and healthy; but upon their return, they are weak, lean, and unfit to be eaten. They are ſeldom, therefore, moleſted upon their retreat; but the great art is to ſeize them when arrived, or to intercept their arrival. In theſe uninhabited iſlands, to which the green turtle chiefly reſorts, the men that go to take them land about night-fall, and without making any noiſe (for thoſe animals, though without any external opening of the ear, hear very diſtinctly, there being an auditory conduit that opens into the mouth) lie cloſe while they ſee the female turtle coming on ſhore. They let her proceed to her greateſt diſtance from the ſea; and then, when ſhe is moſt buſily employed in ſcratching a hole in the ſand, they ſally out and ſurprize her. Their manner is to turn her upon her back, which utterly incapacitates her from moving; and yet, as the creature is very ſtrong and ſtruggles very hard, two men find it no eaſy matter to lay her over. When thus ſecured they go to the next; and in this manner, in leſs than three hours, they have been known to turn forty or fifty turtles, each of which weighs from an hundred and fifty to two hundred pounds. Labat aſſures us that when

the animal is in this helpleſs ſituation, it is heard to ſigh very heavily, and even to ſhed tears.

At preſent, from the great appetite that man has diſcovered for this animal, they are not only thinned in their numbers, but are alſo grown much more ſhy. There are ſeveral other ways, therefore, contrived for taking them. One is, to ſeize them when coupled together, at the breeding ſeaſon, when they are very eaſily approached, and as eaſily ſeen; for theſe animals, though capable of living for ſome time under water, yet riſe every eight or ten minutes to breathe. As ſoon as they are thus perceived, two or three people draw near them in a canoe, and ſlip a nooze either round their necks or one of their feet. If they have no line, they lay hold of them by the neck, where they have no ſhell, with their hands only; and by this means they uſually catch them both together. But ſometimes the female eſcapes, being more ſhy than the male.

Another way of taking them is by the harpoon, either when they are playing on the ſurface of the water, or feeding on the bottom; when the harpoon is ſkilfully darted, it ſticks faſt in the ſhell of the back; the wood then diſengages from the iron, and the line is long

enough for the animal to take its range; for if the Harpooner ſhould attempt at once to draw the animal into his boat till it is weakened by its own ſtruggling, it would probably get free. Thus the turtle ſtruggles hard to get looſe, but all in vain; for they take care the line faſtened to the harpoon ſhall be ſtrong enough to hold it.

There is yet another way which, though ſeemingly awkward, is ſaid to be attended with very great ſucceſs. A good diver places himſelf at the head of the boat; and when the turtles are obſerved, which they ſometimes are in great numbers, aſleep on the ſurface, he immediately quits the veſſel, at about fifty yards diſtance, and keeping ſtill under water, directs his paſſage to where the turtle was ſeen, and, coming up beneath, ſeizes it by the tail; the animal awaking, ſtruggles to get free; and by this both are kept at the ſurface until the boat arrives to take them in.

END OF THE SIXTH VOLUME.